SOLUTIA™

LETTER OF TRANSMITTAL

From: Bruce Yare
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Kevin Turner

Date: 6/6/03

Sauget Area 1

Dead Creek Final Remedy

The following items are:

_X_ Enclosed ____Requested ____ Sent Separately Via:________

No. of Copies	Description
1	**Dead Creek Final Remedy Engineering Evaluation/Cost Analysis**
	Response to Comments and Proposed Response Actions

The above items are submitted:

____ At your request ____ For your review ____ For your signature

____ For your files ____ For your action _X_ your information

Comments:

By: Bruce Yare

SOLUTIA
Solutions for a better life.

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June 6, 2003

Mr. Nabil S. Fayoumi
U. S. Environmental Protection Agency - Region 5
Superfund Division
77 West Jackson Boulevard (SR-6J)
Chicago, Illinois 60604-3590

Re: Response to Comments and Proposed Response Actions
Dead Creek Final Remedy Engineering Evaluation/Cost Analysis
Sauget Area 1, Sauget and Cahokia, Illinois

Dear Mr. Fayoumi:

Attached are responses to comments on the Dead Creek Final Remedy Engineering Evaluation/Cost Analysis for Sauget Area 1, Sauget and Cahokia, Illinois. These comments were in an e-mail message dated March 18, 2003 and were discussed during a meeting held at the Solutia W. G. Krummrich Plant on April 29, 2003. At that meeting, it was agreed that the bulk of the comments were directed at one of the following three areas: 1) the scope of the remaining removal actions; 2) the potential for constituents of concern in the creek bottom soils to leach to the groundwater; and 3) the potential for mercury in the creek bottom soils to bioaccumulate in fish at concentrations of concern.

Rather than responding to each of the comments individually (as has been our past practice), it was agreed that it would be more appropriate for Solutia to present proposed response actions to complete the removal action, as well as to address the Agencies' concerns about the long term issues of leaching to groundwater and mercury bioaccumulation. The attached document presents these response actions.

Please review these proposals and let us know if they adequately address your needs.

Sincerely,

Solutia Inc.

Gary Vandiver

Gary W. Vandiver
Project Coordinator

cc: Kevin Turner USEPA
Sandra Bron - IEPA
Michael Henry - IDNR
Mike Coffey - USF&W
Tim Gouger – USACE
Steven Schmidt - Exxon Mobil
Bill Stone – Environ
Richard Ricci - Lowenstein Sandler
Joseph M. Grana - Cerro
Linda Tape - Husch & Eppenberger
Steven Smith - Solutia
Richard Williams - Solutia
Bruce Yare – Solutia

1.0 EXECUTIVE SUMMARY

Background - On June 28, 1999, the United States Environmental Protection Agency (USEPA) issued a Unilateral Administrative Order to Monsanto Company and Solutia Inc. (Docket No. V-W-99-C-554) pursuant to Section 106(a) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 as amended, 42 U.S.C. Section 9606(a), which was modified on May 31, 2000 and amended on August 29, 2001. The Order required performance of a number of response activities at Sauget Area 1 Creek Segments B, C, D, E and F, Site M and the lift station sump at Prairie du Pont Creek, including sediment removal and post-removal sampling of creek bottom soil. Sediment removal was completed in February 2002 when the last of 46,000 cubic yards of sediments from Creek Segments B, C, D and E and F, Site M and the lift station sump were transferred to the RCRA/TSCA-compliant, on-site containment cell.

Post-removal creek bottom soil sampling was started in October 2001 and completed in February 2002. Sample analysis and data validation were completed in May 2002. Validated data were used to prepare an Engineering Evaluation/Cost Analysis (EE/CA), a Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) for creek bottom soil in Creek Segments B, C, D, E and F and bottom soils in Site M. All three of these reports were submitted to USEPA on June 21, 2002. On August 7, 2002, USEPA commented on the Ecological Risk Assessment. USEPA's comments on the Engineering Evaluation/Cost Assessment were provided on September 26, 2002. Solutia submitted a "Response to Comments on Dead Creek Final Remedy Engineering Evaluation/Cost Analysis, Sauget Area 1, Sauget and Cahokia, Illinois" and a "Dead Creek Final Remedy, Sauget Area 1, Sauget and Cahokia, Illinois, Response to Agency Comments on Ecological Risk Assessment" to USEPA on November 12, 2002. USEPA responded to the Response to Comments documents on March 19, 2003 and met with Solutia on April 29, 2003 to discuss its responses and identify an appropriate course of action.

Human Health Risk Assessment - Based on the results of the Dead Creek Final Remedy Human Health Risk Assessment, Solutia believes that no further action is necessary to protect public health. Access to Dead Creek is generally uncontrolled except for Creek Segment B, which is secured with a fence. Therefore, two exposure scenarios were evaluated in the HHRA: 1) a recreational receptor (i.e., teenager) exposed to COPCs in the creek bottom through wading or swimming and 2) a construction worker exposed to soil during excavation activities in the creek channel. Potential carcinogenic risks for a recreational teenager exposed to creek bottom soils in Creek Segments B, D, E and F and pond bottom soils in Site M are within the target risk range of 1E-6 to 1E-4 and the Hazard Indices are less than 1.0.

Summary of Recreational Teenager Human Health Risks for Exposure to Dead Creek Bottom Soils

	Potential Risk	Hazard Index

	RME	MLE	RME	MLE
CS-B	1.95E-06	6.61E-07	2.77E-02	1.25E-02
CS-D	7.30E-07	7.02E-08	3.58E-02	2.91E-03
CS-E	1.69E-07	3.77E-08	9.78E-03	1.69E-03
CS-F	1.40E-07	3.29E-08	1.84E-03	4.18E-04
Site M	2.23E-05	2.32E-06	2.19E-01	2.68E-02

Potential carcinogenic risks for a construction worker exposed to creek bottom soils in Creek Segments B, D, E and F and pond bottom soils in Site M are within the target risk range of 1E-6 to 1E-4 and Hazard Indices for each segment are less than 1.0.

Summary of Construction Worker Human Health Risks for Exposure to Dead Creek Bottom Soils

	Potential Risk		Hazard Index	
	RME	**MLE**	**RME**	**MLE**
CS-B	2.56E-07	9.78E-08	3.67E-02	2.17E-02
CS-D	7.89E-08	9.17E-09	4.74E-02	4.46E-03
CS-E	1.78E-08	4.94E-09	1.14E-02	2.48E-03
CS-F	1.40E-08	4.16E-09	1.98E-03	5.71E-04
Site M	4.00E-06	3.62E-07	4.58E-01	4.27E-02

No constituents of concern were identified in Creek Segment C; all constituents present in CS-C creek bottom soils were screened out during the COPC identification process.

Ecological Risk Assessment - Potential adverse ecological impacts to fish were identified in the Dead Creek Final Remedy Ecological Risk Assessment, as revised in the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment, for the following constituents and locations in Dead Creek:

Summary of Potential Adverse Ecological Impacts from From Exposure to Dead Creek Bottom Soils

Creek Segment	Constituent	Transect
Creek Segment B	Total PAHs	T0, T3, T12 and T16
	Total PCBs	T0, T1, T3, T5, T6, T8 and T17
	Mercury	T0, T1, T2, T3, T6, T9, T11, T12 and T17
	Zinc	T0, T4, T8, T11 and T12
Creek Segment C	Mercury	T6
Creek Segment D	Total PCBs	T6
	Dioxin	T6
	Zinc	T1 and T2
Creek Segment E	Mercury	T2, T6, T8, T9, T10, T11, T12, T13, T14, T15, T16 and T17
Creek Segment F	Mercury	T3, T5, T9 and T14
	Zinc	T5

Ecological risk assessment results are summarized in Appendix A.

Additional Work - Based on results of the Dead Creek Final Remedy EE/CA, HHRA and ERA, revisions of these documents in response to Agency comments and discussions with the Agency on April 29, 2003, Solutia believes that additional response actions, site investigations and performance monitoring are needed to protect the environment from residual constituent concentrations in Dead Creek bottom soils. *Solutia proposes, subject to the concurrence by USEPA, to undertake additional removal actions, perform* additional site investigations and institute performance monitoring plans, as summarized described below, *under the provisions of the existing* Time-Critical Sediment Removal Action UAO:

Response Actions

- **Creek Segment B** – Install an armored, impermeable liner with the following section throughout the entire length of Creek Segment B as required by the Dead Creek Time Critical Sediment Removal Action UAO.

Armored Channel Liner Section

Top	Riprap	3 to 6-Inch Crushed Limestone
	Protective Layer	Dense Grade Bedding Material
	Geotextile	Non-Woven Cushion Layer
	Membrane Liner	60 mil HDPE
Bottom	Geotextile	Non-Woven Cushion Layer

- **Creek Segment D Transect T6** - Excavate 5,930 cubic yards of creek bottom soil with PCB and Dioxin concentrations greater than site-specific, ecological risk-based concentrations and transfer this material to the on-site containment cell;

- **Creek Segment F Transect T5** - Excavate 11,850 cubic yards of creek bottom soil with Zinc concentrations greater than the site-specific, ecological risk-based concentrations and transfer this material to the on-site containment cell;

Site Investigations

- **Potential Soil to Groundwater Leaching** – Collect soil and groundwater samples at the three locations in each creek segment with the highest predicted potential for cadmium leaching. Analyze each soil sample for Total and TCLP-Extractable Cadmium and each groundwater sample for Total and Dissolved Cadmium to determine if residual cadmium concentrations are leaching from creek bottom soils to groundwater.

Performance Monitoring

- **Fish Tissue** – Ten fish tissue composite samples will be collected annually from Creek Segment F to determine if: Mercury is bioaccumulating in fish tissue; concentration trends of this bioaccumulative constituent are upward, downward or stable and whole body fish tissue concentrations exceed threshold toxicity values.

- **Storm Water** – Storm water samples will be collected quarterly for three years, semiannually for two years and annually thereafter. Samples will be collected at the outlets of Creek Segments B, C, D, E and F and analyzed for SVOCs, Pesticides, PCBs, Cadmium, Copper, Lead, Nickel and Zinc to determine if residual constituent concentrations in creek bottom soils are being transported downstream during storm conditions. Concentration trends will be monitored over time, organic constituent concentrations will be compared to PECs and inorganic constituent concentrations will be compared to ten times PECs to determine if unacceptable concentrations of creek bottom soils are being transported via the surface water pathway.

- **Groundwater** – Groundwater samples will be collected quarterly for three years, semiannually for two years and annually thereafter. Samples will be collected from five monitoring wells located in Creek Segments B, C, D, E and F, one in each creek segment. Monitoring wells, which will be located on the center line of the Dead Creek channel, will have ten foot long screens located from 10 to 20 ft. below the surface of adjacent flood plain. Screens placed at this depth will cover the expected range of groundwater levels, which are normally within 10 to 15 feet of ground surface (bgs). Under dry conditions, depth to groundwater can be as deep as 20 ft. below ground surface. Samples from each well will be analyzed for Cadmium to determine if residual cadmium is leaching from creek bottom soils.

Performance monitoring results will be evaluated at the end of five years to determine whether or not performance monitoring needs to continue. If monitored constituent concentrations are steady state, decreasing or below criteria, monitoring will be discontinued.

Rationale, objectives and detailed description of work to be performed for each of these proposed removal actions, site investigations and performance monitoring plans are included in the following sections of this proposal:

- **Section 2.0** **Removal Actions**
- **Section 3.0** **Site Investigations**
- **Section 4.0** **Performance Monitoring**

2.1 CREEK SEGMENT B RESPONSE ACTION

2.1.1 Basis for Additional Response Action

Additional response action is considered appropriate in Creek Segment B to isolate or remove creek bottom soils that create potential adverse ecological impacts as identified by the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment. Transects with potential adverse ecological impacts and the associated risk drivers are given in Appendix A and summarized below:

Summary of Creek Segment B Sampling Transects with Potential Adverse Ecological Impacts

Transect	Risk Drivers
T0	Total PAHs, Total PCBs, Zinc
T1	Total PCBs
T3	Total PAHs, Total PCBs
T4	Zinc
T5	Total PCBs
T6	Total PCBs
T8	Zinc
T11	Total PCBs, Zinc
T12	Total PAHs, Zinc
T16	Total PAHs
T17	Total PCBs

Additional response action may also be appropriate to isolate or remove residual organic constituents in creek bottom soil in Creek Segment B because of the calculated potential for leaching at the following transects:

Summary of Creek Segment B Sampling Transects with Potential for Soil Leaching to Groundwater

Transect	Potentially Leachable Constituents
T0	Chlorobenzene
T1	Pentachlorophenol, Dieldrin
T3	Nitrobenzene, Pentachlorophenol, Dieldrin
T4	Pentachlorophenol
T5	Chlorobenzene, Pentachlorophenol
T6	Pentachlorophenol
T7	beta-BHC
T8	Pentachlorophenol, beta-BHC
T9	beta-BHC, delta-BHC
T16	Dieldrin
T17	Pentachlorophenol, Dieldrin
T18	Chlorobenzene

Potential leaching calculations are included in Appendix B.

2.1.2 Response Action Area and Volume

Based on the potential for adverse ecological risks and the potential for leaching of residual concentrations of organic constituents from creek bottom soil to groundwater, it is considered appropriate to undertake additional response action at Creek Segment B Transects T0, T1, T3, T4, T5, T6, T7, T8, T9, T11, T12, T16, T17 and T18 to protect the environment and control the potential leaching of organic constituents to groundwater. Response action area and volume are estimated below:

Summary of Creek Segment B Response Action Area and Volume

Creek Segment	Transects > Criteria	Upstream Clean Transect	Downstream Clean Transect	Impacted Channel Length (Feet)	Impacted Channel Area (Sq. Ft.)	Impacted Channel Volume (Cu. Yds.)
• CS-B	T0, T1	T0	T2	200	20,000 (1	5,930 (2,3,4
	T3, T4, T5, T6, T7, T8, T9	T2	T10	800	80,000 (1	23,700 (2,3,4
	T11, T12	T10	T13	300	30,000 (1	8,890 (2,3,4
	T16, T17, T18	T15	T18	300	30,000 (1	8,890 (2,3,4
			Total	**1600**	**160,000**	**47,410**

Notes:
1) Typical creek channel width in CS-B = 100 feet
2) Typical creek channel bottom elevation = EL 398 ft. amsl
3) Typical low groundwater elevation = EL 390 ft. amsl
4) Typical excavation depth = 8 ft.

2.1.3 Response Action Alternatives Analysis

Containment Response Action Alternative - *Installing an armored impermeable liner along the entire* length of Creek Segment B is considered an appropriate additional response action because 1500 ft of the 1800 ft. long channel have residual concentrations in creek bottom soils that exceed risk-based concentrations for the protection of fish or could leach to groundwater. In addition, installation of such a liner is required by the Order:

> **Jurisdiction and General Provisions** (Page1, Paragraph 2) - "The Order also requires installation of a 40 millimeter (mil) [sic] high density polyethylene (HDPE) liner in CS-B"
>
> **Excavated Area Bottom Liner Requirements** (Page 13, Section V.5) - "After excavation and sampling, Respondents shall properly install and maintain a 40 mil, HDPE liner in CS-B of Dead Creek."

Liner installation is also considered an appropriate response action because impacted groundwater from Sauget Area 1 Sites G, H and L can discharge into the north end of Creek Segment B during periods of high groundwater levels. Installation of an armored impermeable liner will prevent this impacted groundwater from discharging to surface water and migrating downstream via the surface water pathway.

An armored liner would have the following section:

Armored Channel Liner Section

Top	Riprap Protective Layer	3 to 6-Inch Crushed Limestone+ Dense Grade Bedding Material

	Geotextile	Non-Woven Cushion Layer
	Membrane Liner	60 mil HDPE
Bottom	Geotextile	Non-Woven Cushion Layer

Preliminary design of the Creek Segment B liner is included in Appendix C.

Removal Response Action Alternative - Excavation of creek bottom soils in Creek Segment B does not appear to be an appropriate response action because potential adverse impacts associated with residual concentrations in creek bottom soils can be controlled by installation of an armored HDPE liner as required by the UAO. In addition, the June 21, 2002 Dead Creek Final Remedy Engineering Evaluation/Cost Analysis demonstrated that a channel liner in Creek Segment B provided the same level of human health and environmental protection as a removal remedy at a substantially lower cost. The Dead Creek Final Remedy EE/CA evaluated the following no action, containment and removal alternatives for creek bottom soils by comparing each alternative to the other alternatives and identifying the relative advantages and disadvantages of each.

Dead Creek Final Remedy Engineering Evaluation/Cost Analysis Remedial Alternatives

- **Creek Bottom Soils Alternative A – No Action**
- **Creek Bottom Soils Alternative B – Containment**
  - Institutional Controls
  - Containment
    - Lining 600 ft. of Creek Segment B
    - Lining 800 ft. of Creek Segment F
  - Monitoring
    - Surface Water Quality
    - Fish Tissue Bioaccumulation
- **Creek Bottom Soils Alternative C – Removal**
  - Institutional Controls
  - Removal
    - Excavation and On-Site Disposal of 17,780 Cubic Yards from Creek Segment B
    - Excavation and On-Site Disposal of 2,220 Cubic Yards from Creek Segment F
    - Excavation and Off-Site Treatment of 9,630 Cubic Yards from Creek Segment F
  - Monitoring
    - Surface Water Quality
    - Fish Tissue Bioaccumulation

Containment and removal were the only remedial technologies identified as implementable and effective at managing the risks associated with residual concentrations in creek bottom soil. For the removal alternative, any excavated creek bottom soil that could not be transferred to the on-site containment cell was taken off-site for treatment and/or disposal.

A forced ranking system was used to identify the alternative that best achieved the requirements of the seven evaluation criteria used to evaluate remedial alternatives. In this forced ranking system, the alternative that best met the requirements of a criterion was awarded a score of 1, the second best alternative was awarded a score of 2 and the third best alternative was awarded a score of 3. Using this ranking method, the alternative with the lowest score was the one that best met the requirements of the seven criteria. The comparative analysis of alternatives is summarized in the following table:

Dead Creek Final Remedy EE/CA Comparative Analysis of Interim Remedial Alternatives

	Alternative A (No Action)	Alternative B (Containment)	Alternative C (Removal)
Threshold Criteria			
• Overall Protection of Human Health and the Environment	3	1	2
• Compliance with ARARs	3	2	1
Subtotal	6	3	3
Balancing Criteria			
• Long-term Effectiveness and Permanence	3	1	2
• Reduction of Toxicity, Mobility or Volume	3	2	1
• Short-Term Effectiveness	3	1	2
• Implementability	1	2	3
• Cost	1	2	3
Subtotal	11	8	11
Total Score	17	11	14

No costs are associated with Alternative A. Alternative B ($2,016,647) was less expensive than Alternative C ($7,516,988) on a 30-year present value basis and provided similar protection of public health and the environment. Estimated costs for each alternative are summarized below:

Dead Creek Final Remedy Engineering Evaluation/Cost Analysis Remedial Alternative Cost Estimates

Project Element	Alternative B (Containment)	Alternative C (Removal)
Institutional Controls	155,113	155,113
Monitoring	453,426	453,426
Remedial Action	1,139,220	6,712,310
Operation and Maintenance	268,888	196,139
30-Year Present Value Cost	$2,016,647	$7,516,988

While Alternative A was clearly in lower cost and more readily implementable, Alternatives B and C were more effective short term and were the better alternatives for protecting public health and the environment, complying with ARARs, providing long-term effectiveness and permanence and reducing mobility, toxicity or volume. Alternative B scored higher than Alternative C because it provided greater long-term effectiveness and permanence by preventing the discharge of impacted groundwater from Sites G, H and L into Creek Segment B. Alternative C provided more reduction of mobility, toxicity and volume than Alternative B. Alternative B and Alternative C could both achieve compliance with ARARs. Alternative C (Removal) was considered to be better able to achieve ARARs than Alternative B (Containment). Alternative B provided effective protection of public health and the environment at a lower cost than Alternative C.

2.1.4 Proposed Creek Segment B Response Action

The suite of remedial alternatives evaluated in the Dead Creek Final Remedy EE/CA was selected to be representative of the remedial alternatives that are available, rather than inclusive of all possible approaches. Evaluating containment and removal remedies separately for the purpose of preparing the EE/CA does not preclude the use of more than one alternative throughout Dead Creek, or the selection of different process options for containment or disposal, assuming those other alternatives are implementable and effective. Given the fact that the estimated volume of creek bottom soil to be excavated from Creek Segment B (47,410 cubic yards) greatly exceeds the remaining capacity of the on-site containment cell (19,000 cubic yards) and that the Time Critical Sediment Removal Action UAO requires installation of a liner in Creek Segment B, it is considered appropriate to treat Creek Segment B by containment and to consider excavation and on-site disposal for Creek Segments D and F.

2.2 CREEK SEGMENT D RESPONSE ACTION

2.2.1 Basis for Additional Response Action

Additional response action is considered appropriate in Creek Segment D to isolate or remove creek bottom soils that create potential adverse ecological impacts as identified by the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment. Transects with potential adverse ecological impacts to fish, and the associated risk drivers, are summarized below:

Summary of Creek Segment D Sampling Transects with Potential Adverse Ecological Impacts

Transect	Risk Drivers
T1	Zinc
T2	Zinc
T6	PCBs, Dioxin

Potential adverse ecological impacts are predicted for Transects T1 and T2 on the basis of residual zinc in creek bottom soils at concentrations higher than the site-specific, risk-based concentration for the protection of fish. Additional response action to protect fish is not considered appropriate at Transects T1 and T2 because annual dewatering/desiccation of Dead Creek due to weather and precipitation patterns in the American Bottoms and implementation of public health protection measures to control mosquitoes in Creek Segments B, C, D and E result in a habitat is not conducive to a sustainable fish population.

Dry conditions are not unusual in Dead Creek from late summer through the winter. Pools in Creek Segments B, C, D and E routinely dewater or dry up during these warm weather and/or low rainfall periods. Examination of the creek bed and riparian vegetation suggests that Dead Creek does not retain substantial amounts of standing water during the summer months and that water levels are dependent on relatively recent precipitation. Historical discharge data for other creeks in St. Clair County, Illinois (Canteen Creek, Mud Creek and Richland Creek) indicates a high variability in discharge over each year. However, for a large portion of each year, discharge is very low, often near zero. Both of these patterns occur each year, suggesting that low to zero flow conditions, as seen in Dead Creek, are common in the American Bottoms.

Dead Creek is an intermittent stream that acts as a set of shallow ponds rather than a riverine system. During dry weather, water levels in Creek Segments B, C, D and E fall below the culvert inverts at Judith Lane, Edwards and Cahokia Streets, Kinder Street, Jerome Lane, Edgar Street and the Parks College parking lot, respectively, creating a series of stagnant, discontinuous pools upstream of each road crossing. At the request of the Village of Cahokia, Solutia installed a storm water dewatering system in Dead Creek in February 2003 and began operating the system in March 2003 in order to dewater Creek Segments B, C, D and E (Appendix D). The Village requested this action as a public health measure to control mosquitoes in response to the threat of West Nile virus, which killed more than 50 Illinois residents in 2002. Significant portions of Dead Creek Segments C, D and E are bordered by residential areas:

Summary of Residential Land Use Adjacent to Dead Creek Segments B, C, D and E

Segment	East Bank	West Bank
CS-B	8.4 %	0.0 %
CS-C	60.0 %	57.2 %
CS-D	100.0 %	88.9 %
CS-E	22.7 %	45.4 %

Creek Segment D contains the highest amount of residential land use of any creek segment: 100 percent residential land use on its east bank and 88.9 percent on its west bank.

To protect public health, a total of six lift pumps were installed at the following locations in Dead Creek:

Summary of Dead Creek Storm Water Pumping System Lift Station Locations

Creek Segment C	1	Upstream of Pipeline Crossing South of Judith Lane
	2	Upstream of Cahokia and Edward Streets
	3	Upstream of Kinder Street
Creek Segment D	4	Upstream of Jerome Lane
Creek Segment E	5	Upstream of Edgar Street
	6	Upstream of Parks College Parking Lot

Installation of the storm water pumping system and elimination of standing water in Creek Segments B, C, D and E, results in a situation where aquatic habitat exists only until the pumping system dewaters impounded storm water. Dewatering typically takes three to five days and results in a dry channel over most of Creek Segments C, D and E.

Since there are periods during which storm water can flow through Creek Segments B, C, D and E, i.e. during and immediately after rain storms when water levels are above culvert invert elevations, performance monitoring to ensure that residual zinc in creek bottom soils is not transported downstream during storm events is considered an appropriate response action for Transects T1 and T2. Proposed performance monitoring is discussed below (Surface Water Monitoring).

2.2.2 Response Action Area and Volume

Based on potential ecological risks to fish, it is considered appropriate to take additional action at Creek Segment D Transect T6 to protect the environment. Response action area and volume are estimated below:

Summary of Creek Segment D Response Action Area and Volume

Creek Segment	Transects Exceeding Risk Based Concentrations	Upstream Clean Transect	Downstream Clean Transect	Impacted Channel Length (Feet)	Impacted Channel Area (Sq. Ft.)	Impacted Channel Volume (Cu. Yds.)
• CS-D	T6	T5	T6	200	20,000 (1	5,930 (2,3,4
			Total	**200**	**20,000**	**5,930**

Notes:
1) Typical creek channel width in CS-D = 100 feet
2) Typical creek channel bottom elevation = EL 398 ft. amsl
3) Typical low groundwater elevation = EL 390 ft. amsl
4) Typical excavation depth = 8 ft.

2.2.3 Proposed Creek Segment D Response Action

Additional removal action is considered appropriate at Transect 6 because the risk drivers at this sampling location, PCBs and Dioxin, are bioaccumulative constituents that should be isolated or removed from the environment. Isolation could be achieved by lining the channel of Creek Segment D between Jerome Lane and Transect 5, the next upstream clean sampling transect. Removal could be achieved by excavating creek bottom soils between Jerome Land and Transect 5 and transferring them to the on-site containment cell. This would use 6,000 cubic yards (in round numbers) of the 19,000 cubic yards of remaining cell capacity. Since there is available capacity in the on-site containment cell, excavation and isolation of these creek bottoms soils in the on-site containment cell is considered to be a more appropriate additional response action than isolation by containment with a liner.

2.3 CREEK SEGMENT F RESPONSE ACTION

2.3.1 Basis for Additional Response Action

An additional response action is considered appropriate in Creek Segment F to isolate or remove creek bottom soils that create potential adverse ecological impacts as identified by the June 21, 2002 Dead Creek Final Remedy Ecological Risk Assessment. Transects with potential adverse ecological impacts to fish, and the associated risk drivers, are summarized below:

Summary of Creek Segment F Sampling Transects with Potential Adverse Ecological Impacts

Transect	Risk Drivers
T5	Zinc

2.3.2 Response Action Area and Volume

Based on these potential ecological risks, it is considered appropriate to take additional remedial action at Creek Segment F Transect T5 to protect the environment. Response action area and volume are estimated below:

Summary of Creek Segment D Remediation Area and Volume

Creek Segment	Transects Exceeding Risk Based Concentrations	Upstream Clean Transect	Downstream Clean Transect	Impacted Channel Length (Feet)	Impacted Channel Area ($Feet^2$)	Impacted Channel Volume ($Yards^3$)
• CS-F	T5	T4	T6	800	40,000 (1	11,850 (2,3,4
			Total	800	40,000	11,850

Notes:
1) Typical creek channel width in CS-F = 50 feet
2) Typical creek channel bottom elevation = EL 398 ft. amsl
3) Typical low groundwater elevation = EL 390 ft. amsl
4) Typical excavation depth = 8 ft.

2.3.3 Proposed Creek Segment F Response Action

Potential adverse ecological impacts at Transect 5 could be controlled by isolating these creek bottom soils with an armored, impermeable liner or by removing the impacted creek bottom soils and transferring them to the on-site containment cell. Removal and transfer to the on-site containment cell is considered a more appropriate additional response action than installation of an armored impermeable liner because Creek Segment F downstream of the Terminal Railroad Association embankment is the only non-urbanized stretch of Dead Creek with the potential to be conducive to a sustainable fish population. For this reason, removal of creek bottom soils with residual zinc concentrations and transfer of this material to the on-site containment cell is considered a more appropriate additional response action than installation of an armored impermeable liner.

Installation of an armored impermeable liner would make it difficult to create a habitat conducive to a sustainable fish population. Other factors make creation of such a habitat difficult, including:

- Storm water runoff from the Phillips Pipeline Company property north of Cargill Road discharging into this portion of Dead Creek is needed to sustain stream flow;
- Farming is conducted along a good portion of the east bank of this creek segment; and
- The Borrow Pit Lake at the downstream end of this creek segment is used as a storm water detention basin by the MetroEast Sanitary District.

In addition, it will be difficult to implement the approved Dead Creek Sediment Removal Action Mitigation Plan if an armored impermeable liner is installed. Restoring this stretch of Dead Creek as described in the Mitigation Plan tips the balance in favor of removal and on-site containment.

Since there is available capacity in the on-site containment cell, excavation and isolation of these creek bottoms soils in the on-site containment cell is considered to be a more appropriate additional response action than isolation with by containment with a liner. This would use 12,000 cubic yards (in round numbers) of the 13,000 cubic yards of remaining cell capacity after soils containing residual concentrations of PCBs and Dioxin are removed from Creek Segment D.

3.1 SOIL TO GROUNDWATER LEACHING INVESTIGATION

3.1.1 Observed Soil to Groundwater Leaching

Leaching of residual constituent concentrations in creek bottom soils was to be evaluated in the Dead Creek Final Remedy EE/CA using TCLP extracts of selected creek bottom soil samples (10 percent of the total number of samples collected). Extracts were to be analyzed for VOCs, SVOCs, Pesticides, Herbicides, PCBs, Dioxin and Metals. Unfortunately, through a misunderstanding between field sampling personnel and the analytical laboratory, the analytical laboratory only analyzed the selected samples for RCRA Hazardous Waste Characteristic TCLP parameters. Re-sampling and analysis could not be performed before the required June 2002 submittal date for the Dead Creek Final Remedy EE/CA. For that reason, shallow groundwater quality data collected during performance of the Sauget Area 1 EE/CA and RI/FS Support Sampling Plan was used to address the issue of creek bottom soil leaching to groundwater.

Shallow groundwater samples were collected at or in the vicinity of Creek Segment B and Site M, both of which had higher sediment constituent concentrations than sediments in Creek Segments C, D, E and F. Two of these sampling locations were specifically selected to address the issue of contaminant migration from sediments in Creek Segment B and Site M to shallow groundwater adjacent to these potential sources of groundwater impact. One shallow groundwater sampling location was located immediately adjacent to Creek Segment B just north of Judith Lane (SGW-S2). Another shallow groundwater sampling locations was located immediately adjacent to Site M at the west end of Walnut Street (SGW-S1). Samples were collected at three depths at each of these locations (at the water table 15 feet below ground surface and at 20 and 40 feet below ground surface). Time-series sampling was also conducted from a well completed at 40 feet below ground surface at each of these sampling locations (TS-S2 at Judith Lane and TS-S1 at Walnut Street).

Maximum detected concentrations in unfiltered shallow groundwater collected from sampling locations SGW-S2/TS-S2 (Creek Segment B at Judith Lane) and SGW-S1/TS-S1 (Site M at Walnut Street) are summarized below along with maximum reported constituent concentrations in Creek Segment B and Site M post-removal bottom soils:

Maximum Constituents Concentration Detected in Unfiltered Shallow Groundwater and Bottom Soils, ppb

	Class I Groundwater Standard	Creek Segment B		Site M	
		Groundwater	Bottom Soil	Groundwater	Bottom Soil
VOCs					
• Trichloroethylene	5	0.064	34	ND	ND

SVOCs					
• 1, 4-Dichlorobenzene	1	ND	5,500	0.39	4,100
• Pentachlorophenol	75	ND	44,000	0.077	290
• Bis(2-ethylhexyl)phthalate	6	0.70	81,000	ND	1,400
• Di-n-butylphthalate	700	ND	100	0.37	ND
PAHs					
• Acenapthylene	420	0.65	240	0.87	ND
• Benzo(a)anthracene	0.13	**0.37**	1,900	**0.52**	720
• Benzo(a)pyrene	0.2	ND	1,200	**0.49**	490
• Benzo(b)fluoranthene	0.17	ND	1,400	**0.44**	640
• Benzo(g,h,i)perylene	No Std.	0.72	890	1.1	410
• Chrysene	1.5	0.45	1,900	0.70	820
• Fluorene	280	1.3	3,500	1.6	490
• Indeno(1,2,3-cd)pyrene	0.43	ND	830	**0.66**	87
Pesticides					
• alpha-BHC	0.11	ND	2.9	0.0037	2.3
• beta-BHC	No Std.	0.0020	7.7	0.0064	ND
• gamma-BHC	0.2	0.0059	2.3	0.032	4.4
• gamma-Chlordane	2	0.0012	0.4	0.0022	ND
• 4, 4-DDE	10	0.0020	35	ND	35
• Dieldrin	9	ND	30	0.0032	ND
• Endosulfan I	42	ND	12	0.0011	ND
• Endrin Aldehyde	2	ND	ND	0.0032	66
• Heptachlor	0.4	ND	0.75	0.0019	160
• Heptachlor epoxide	0.2	ND	410	0.0014	860
• Methyoxychlor	40	ND	6.6	0.0054	ND
Herbicides					
• 2, 4-DB	No Std.	0.66	64	ND	66
• 2, 4, 5-TP	50	ND	2	0.11	ND
Total PCBs	0.5	ND	84,830	0.056	27,138
Dioxin TEQ	No Std.	0.00004	17	0.0001	5
Metals					
• Cadmium	5	ND	57,000	ND	21,000
• Copper	650	5.9	10,000,000	56	5,200,000
• Lead	7.5	5.3	700,000	**36**	270,000
• Mercury	2	0.10	840	0.38	300
• Nickel	100	22	630,000	59	1,170,000
• Zinc	5,000	30	11,000,000	49	12,000,000

Note: Bold concentrations are greater that Illinois Class I Groundwater Standard

A total of 28 organic constituents were detected in shallow groundwater immediately adjacent to Creek Segment B and Site M. Of these 28 organic constituents, four were detected at concentrations higher than the Illiniois Class I Groundwater Standards:

Summary of Constituents Detected in Shallow Groundwater at Concentrations > Class I GW Standard, ppb

	Soil Concentration	Groundwater Concentration	Dilution Factor
• Benzo(a)anthracene (Creek Segment B	1920	0.37	1385
• Benzo(a)anthracene (Site M)	720	0.52	5135
• Benzo(a)pyrene	490	0.49	1000

• Benzo(b)fluoranthene	640	0.44	1455
• Indeno(1,2,3-cd)pyrene	87	0.66	132
• Lead	270,000	36	7500

Dilution factors (soil concentration/groundwater concentration), ranging from a low of 132 to a high of 7500, provide an indication that leaching of residual constituent concentrations from bottom soils to groundwater is not a major contaminant migration pathway at Creek Segment B and Site M.

Comparison of detected groundwater concentrations to maximum observed pre-removal sediment concentrations provides further evidence that leaching to groundwater is not a significant migration pathway. Comparing bottom soil residual concentrations in Creek Segment B and Site M to pre-removal action sediment concentrations further reinforces the evidence that leaching to groundwater is not a significant migration pathway:

Summary of Sediment, Bottom Soil and Groundwater Concentrations in CS-B and Site M, ppb

	Sediment	Soil	Groundwater
• Benzo(a)anthracene (Creek Segment B	9,000	1920	0.37
• Benzo(a)anthracene (Site M)	1,300	720	0.52
• Benzo(a)pyrene	10,000	490	0.49
• Benzo(b)fluoranthene	30,000	640	0.44
• Indeno(1,2,3-cd)pyrene	9,000	87	0.66
• Lead	24,000,000	270,000	36

Sediment concentrations are up to two orders of magnitude higher than creek bottom soil concentrations which, in turn, are two to four orders of magnitude higher than the groundwater concentrations. Sediment to groundwater dilution factors ranging from 2,500 for Benzo(a)anthracene to 68,182 for Benzo(b)fluoranthene provide an additional indication that leaching of constituents from sediments and residual concentrations in creek bottom soil is not a major migration pathway.

Comparing contamination migration via the sediment to creek bottom soil to groundwater pathway to contaminant migration from Sites G, H and L to groundwater provides additional evidence that contaminant migration by the former pathway is limited:

Summary of Source Area Fill Material and Groundwater Maximum Concentrations at Sites G, H and L, ppb

	Fill Material	Groundwater
• Benzo(a)anthracene	377,500	1.90
• Benzo(a)pyrene	271,000	5.70
• Benzo(b)fluoranthene	ND	3.70
• Indeno(1,2,3-cd)pyrene	135,900	5.60

• Lead	4,500,000	50

Note – Source area fill material concentrations from 1998 Ecology and Environment, Inc. "Expanded Site Investigation, Dead Creek Project Sites at Cahokia/Sauget, Illinois, Volume 2 of 2" report prepared for the Illinois Environmental Protection Agency

3.1.2 Predicted Soil to Groundwater Leaching

USEPA did not accept the information included in the Dead Creek Final Remedy EE/CA as conclusive evidence that leaching of residual constituents from creek bottom soils to groundwater was not occurring. In the absence of site-specific leaching data, Solutia attempted to address the issue by using a soil to groundwater leaching estimation process contained in the Illinois TACO regulations (35 IAC 742). Leaching estimates using this methodology were revised in response to March 18, 2003 Agency comments and the results of these revisions are given below except for the organic leaching results for Creek Segment B, which are discussed in Section 2.1 Creek Segment B Response Action above.

Residual concentrations of Dieldrin, beta-BHC and 1,1,2,2-Tetrachloroethane are predicted to leach from creek bottom soils in Creek Segments C, D and E at concentrations greater than Illinois Class I Groundwater Standards at the following locations:

Calculated Potential for Organics Leaching from Creek Bottom Soils

CS-D	T6	Dieldrin
CS-E	T16	Dieldrin
CS-F	T3	beta-BHC
	T16	1, 1, 2, 2-Tetrachloroethane

Additional investigation of the soil to groundwater pathway is not considered appropriate for organics because:

- Potential for leaching from creek bottom soil to groundwater occurs at only at 4 out of 49 sampling transects in a 15,000 ft. long channel;
- Dead Creek is bordered by urban and agricultural areas and commonly used pesticides (beta-BHC and Dieldrin) are predicted to result in soil to groundwater leaching at three of these four transects all of which are located in residential or agricultural areas; and
- Predicted Tetrachloroethane leaching from creek bottom soil at the last sampling transect in Creek Segment F is unlikely given the volatile nature of this constituent.

Cadmium is the only potentially leachable metal in creek bottom soils:

Calculated Potential for Cadmium Leaching from Creek Bottom Soils

CS-B	T0, T1, T2, T3, T6, T7, T8, T9, T10, T11, T12, T17 and T18
CS-C	T1, T2, T3, T4, T6, T7, T8 and T9
CS-D	T1, T2, T3, T4, T5 and T6
CS-E	T1, T2, T3, T4, T5, T6, T7, T9, T12, T16 and T17
CS-F	T5, T6, T7, T8, T9, T10, T11, T12, T14 and T15

Available soil and groundwater data indicates that leaching of cadmium from source area fill material, pre-removal sediments and residual concentrations in creek bottom soils to groundwater, is not a contaminant migration pathway. Cadmium was detected in Site G, H and L fill material at concentrations up to 294,000 ppb, however, it was not detected in downgradient groundwater (MDL = 5 ppb). Cadmium was not detected in groundwater adjacent to Creek Segment B and Site M, at a detection limit of 5 ppb, even though pre-removal sediment concentrations were 24,000 and 17,000 ppb and bottom soil concentrations were 21,000 and 57,000 ppb, respectively. However, because residual cadmium concentrations are present in creek bottom soils, there is a potential for cadmium to leach to groundwater at concentrations higher than the Illinois Class I Groundwater Standard of 5 ppb based on leaching estimates derived from TACO Tier 2 estimating procedures.

3.1.3 Proposed Soil to Groundwater Leaching Investigation

Additional investigation of the soil to groundwater leaching pathway is considered appropriate for cadmium because of the calculated potential for creek bottom soils to leach cadmium to groundwater using TACO Tier 2 estimating procedures. Cadmium leaching to groundwater will be evaluated by collecting soil and groundwater samples at three locations in each creek segment as shown below:

Proposed Cadmium Leaching Sampling Locations

	Sampling Station	Transect Sampling Group
CS-B	1	**T0, T1, T2** and T3
	2	**T6, T7, T8,** T9, T10, **T11** and T12
	3	**T17 and** T18
CS-C	1	**T1 and T2**
	2	**T3 and T4**
	3	**T6, T7,** T8 and T9
CS-D	1	**T1 and** T2
	2	T3 and **T4**
	3	T5 and **T6**
CS-E	1	**T1, T2,** T3, T4, T5, T6 and **T7**
	2	**T9 and** T12
	3	**T16 and** T17
CS-F	1	**T5, T6, T7** and T8
	2	**T9,** T10, T11 and **T12**
	3	**T14 and** T15

Note – Bold transects are proposed soil and groundwater sampling locations.

Sampling stations will be located at transects with the highest calculated potential for cadmium leaching from soil to groundwater as shown in bold above.

Continuous soil cores will be collected from the creek bed to the water table using push sampling techniques. These continuous soil cores will be subdivided into two-foot long samples which will be analyzed for Total and TCLP-Extractable Cadmium. A groundwater sample will be collected immediately below the water table using a push sampling device equipped with a two-ft. long intake and low-flow sampling techniques. Groundwater samples will be analyzed for Total (Unfiltered) Cadmium, Dissolved (Filtered) Cadmium and Total Suspended Solids. Assuming a depth to groundwater of ten feet, a total of 75 soil samples will be collected and analyzed using the methods, procedures and protocols included in the Sauget Area 1 EE/CA and RI/FS Support Sampling Plan Field Sampling Plan and Quality Assurance Project Plan approved by USEPA on September 9, 1999.

Samples will be collected from the lowest point in the channel at each of the 15 sampling locations:

Number of Soil Sampling Stations	15	
Number of Soil Samples per Station	5	
Number of Soil Samples	75	
Analyses	Total Cadmium	USEPA SW846 Method 7131A
	TCLP Extractable Cadmium	USEPA SW846 Method 1311

Number of Groundwater Sampling Stations	15	
Number of Groundwater Samples per Station	1	
Number of Groundwater Samples	15	
Analyses	Total Cadmium	USEPA SW846 Method 7131A
	Dissolved Cadmium	USEPA SW846 Method 7131A
	Total Suspended Solids	

Soil and groundwater cadmium concentrations will be plotted as a function of depth below the bottom of the creek channel to determine whether or not cadmium is leaching from creek bottom soils to groundwater. If cadmium is leaching to groundwater at concentrations higher than the 5 ug/l Illinois Class I groundwater standard, evaluation of the risks associated with cadmium migration in the groundwater system is considered appropriate.

4.1 FISH TISSUE PERFORMANCE MONITORING

4.1.1 Performance Monitoring Rationale

Fish tissue monitoring is considered an appropriate performance measure because known bioaccumulative constituents (PAHs, Pesticides, PCBs, Dioxin and Mercury) were present as residual concentrations in creek bottom soils after completion of sediment removal. Due to dewatering/desiccation of Dead Creek in response to annual precipitation patterns and installation of a storm water dewatering system in Creek Segments B, C, D and E as a public health measure, only Creek Segment F can be expected to contain water long enough to be conducive to a sustainable fish population. Creek Segment F north of the Terminal Railroad embankment dries up in warm weather and/or low rainfall periods. Creek Segment F south of the embankment dewaters but does not dry up, probably as a result of water flow from the Phillips Pipeline Co. property. Therefore, it is considered appropriate to focus fish tissue performance monitoring on this portion of Creek Segment F.

As directed by the Agency, Total PAHs and Pesticides were added to the list of known bioaccumulative compounds (PCBs, Dioxin and Mercury) to be evaluated in the Dead Creek Final Remedy Ecological Risk Assessment. This evaluation was included in the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment. Potential risks due to residual concentrations of PAHs in creek bottom soils were determined by using USEPA's Draft Equilibrium Partitioning Sediment Guidelines for PAH Mixtures, as directed by the Agency. This evaluation concluded:

> **Page 14, Last Paragraph** - "some creek bottom soils in Creek Segment B are not protective of benthic organisms. However, it should be noted that the frequency of false positives in this model is expected to be high because an adjustment factor was used to account for the fact that only 13 PAHs, rather than 34, were examined. Results of the ESG Model indicate that soils in Creek Segments C, D, E and F are protective of benthic organisms based on the bioaccumulation of PAHs."

For this reason, and the fact that the Time Critical Sediment Removal Action UAO requires installation of an impermeable liner in Creek Segment B, PAHs are not included in the fish tissue performance monitoring plan.

Pesticides are not included in the fish tissue performance monitoring program for two reasons. First, Aldrin, apha-BHC, beta-BHC, delta-BHC, gamma-BHC, Endosulfan I, Endrin ketone, Heptachlor, Heptachlor expoxide and Methoxychlor were not detected in creek sediment or fish tissue samples collected during implementation of the Sauget Area 1 EE/CA and RI/FS Support Sampling Plan. Second, DDT, Dieldrin and Chlordane concentrations in creek bottom soils do not exceed their site-specific, risk-based concentrations derived from average and maximum BSAFs.

Total PCBs and Dioxin are not included in the fish tissue performance monitoring program because Total PCBs and/or Dioxin were detected in concentrations greater than site-specific, risk-based levels only at Creek Segment B Transects T0 and T3 and Creek Segment D Transect T6. These creek bottom soils will be isolated in Creek Segment B by installation of an armored, impermeable liner and removed from Creek Segment D and transferred to the on-site containment cell.

Mercury was selected as a COPC in the June 30, 2001 Sauget Area 1 EE/CA and RI/FS Ecological Risk Assessment due to exceedance of ecological thresholds for sediments and identified as a COC due to a potential unacceptable impacts (toxicity) to forage fish in the Borrow Pit Lake and birds (Great Blue Heron) feeding on the forage fish. A potential unacceptable ecological impact was predicted due to the presence of 0.6 mg/kg of mercury in a composite whole body forage fish tissue sample collected from the Borrow Pit Lake:

Summary of Total Mercury Concentrations in Borrow Pit Lake Whole Body Biota Samples, mg/kg

	Sample 1	Sample 2	Sample 3
Bottom Feeder Fish	0.05	0.075	**0.26**
Forage Fish	0.052	**0.6**	ND (0.1)
Predator Fish	ND (0.016)	0.057	0.064
Shrimp	ND (0.091)	NS	NS
Clams	ND (0.074)	ND (0.091)	ND (0.10)

Notes:

1) **Bold** concentrations indicate exceedance of the 0.25 mg/kg whole body predator fish toxicity value for Mercury. Whole body forage fish toxicity value is 0.8 mg/kg.
2) **NS** = No Sample

The source of mercury detected in Forage Fish Sample 2 is not known.

During implementation of the Sauget Area 1 EE/CA and RI/FS Support Sampling Plan, sediment samples were collected in the Borrow Pit Lake to determine the impact, if any, of discharges from Dead Creek on the Borrow Pit Lake. If Dead Creek was a migration pathway from source areas (Sites G, H, I and L) in the upstream portion of its watershed to the Borrow Pit Lake, there should be a concentration high where Dead Creek discharges into the Borrow Pit Lake. Sediment deposition typically occurs when a stream enters a lake because water velocity decreases and the energy environment is too low to keep all of the sediments in suspension.

Four sediment samples were collected to determine whether or not impacted sediment deposition was occurring at the mouth of Dead Creek, i.e. a concentration high or "hot spot". One sample was collected 3,000 ft. upstream of the confluence of Dead Creek and the Borrow Pit Lake in the backwater area, a second sample was collected 200 ft upstream of the confluence of Dead Creek with the Borrow Pit Lake, a third sample was collected at the mouth of Dead Creek and the fourth sample was collected 200 ft. downstream of the confluence. Mercury analyses from these samples are given below, along with copper and zinc concentrations, metals that are known site-specific constituents:

Summary of Sediment Metal Concentrations at the Confluence of Dead Creek and the Borrow Pit Lake, mg/kg

	Mercury	Copper	Zinc
Backwater of Borrow Pit Lake, 300 ft. Upstream of Confluence	0.091	48	320
200 ft. Upstream of Dead Creek Confluence	0.11	64	36
Mouth of Dead Creek	0.45	240	1,600
200 ft. Downstream of Dead Creek Confluence	0.16	36	250

These data indicate that a metals "hot spot" (concentration high) occurs at the mouth of Dead Creek where the channel portion of Creek Segment F enters the Borrow Pit Lake. None of these data indicate there is a mercury concentration high ("hot spot") in the Borrow Pit Lake sediments. From an ecological impact perspective, mercury concentrations in two of the three sediment samples from the Borrow Pit Lake were lower than all of the threshold values considered to pose ecological food chain risks in the June 21, 2002 Dead Creek Final Remedy Ecological Risk Assessment:

Comparison of Borrow Pit Lake Sediment Mercury Concentrations to Ecological Screening Levels, mg/kg

Borrow Pit Lake Sediment Concentration			Ecological Screening Levels			
Sample 1	Sample 2	Sample 3	TEL	TEC	LEL	PEC
0.091	0.11	**0.16**	0.13	0.18	0.20	1.06

Notes: 1) Concentrations higher than screening levels indicated in bold print
2) TEL = Florida Sediment Quality Assessment Guidelines
3) TEC = Sediment Quality Guidelines Threshold Effects Concentration
4) LEL = Ontario Guidelines Lowest Effects Level
5) PEC = Sediment Quality Guidelines Probable Effects Concentration

One of the three Borrow Pit Lake sediment samples (Sample 3) exceeded the lowest of the three ecological screening levels by 0.03 mg/kg. Sample 3 was collected 200 ft. downstream of the confluence of Dead Creek with the Borrow Pit Lake.

In the June 21, 2002 Sauget Area 1 Dead Creek Final Remedy Ecological Risk Assessment, mercury was not evaluated as a COC because mercury concentrations in composite fish samples collected during implementation of the Sauget Area 1 EE/CA and RI/FS Support Sampling Plan could not be demonstrated to be dependent on sediment mercury concentrations. Statistical regression analysis indicate there was not a strong or statistically significant (r = - 0.2391) relationship between observed mercury concentrations in sediment and fish tissue. Consequently, a site-specific BSAF was not derived for mercury uptake by fish from residual concentrations in creek bottom soils.

As directed by the Agency, maximum and average site-specific BSAFs were calculated for mercury in the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment using the following forage fish tissue and sediment data from Creek Segments B and D and the Borrow Pit Lake:

Total Mercury Concentrations Used to Determine Site-Specific BSAFs, mg/kg

	Forage Fish Tissue Samples			Pre-Removal Sediment Samples		
	1	2	3	1	2	3
CS-B	ND (0.095)	NS	NS	0.96	1.5	1.4
CS-D	0.018	NS	NS	0.5	0.42	0.35
Borrow Pit Lake	0.052	0.6	ND (0.1)	0.091	0.16	0.11
Reference Area 1	0.05	NS	NS	0.042	0.063	NS
Reference Area 2	0.051	0.064	0.046	0.046	0.048	0.04

Note: NS = No Sample

Site-specific maximum and average mercury BSAFs were calculated using the formula:

Mercury BSAF = Concentration in Fish Tissue, mg/kg wet weight/Concentration in Sediment, mg/kg dry weight

When mercury was not detected in sediment samples, one half of the detection limit was used in these calculations. BSAF calculations are summarized below:

Summary of Calculated Mercury BSAFs for Forage Fish and Creek Bottom Soils

	Forage Fish Composite Samples		
	Sample 1	Sample 2	Sample 3
CS-B	NDFF	NFFS	NFFS
CS-D	0.0426	NFFS	NFFS
Borrow Pit Lake	0.419	4.84	NDFF
Reference Area 1	0.952	NFFS	NFFS/NCBSS
Reference Area 2	1.17	1.47	1.06

Note: **NDFF** = Not Detected in Forage Fish
NDCBSS = Not Detected in Creek Bottom Soil

A maximum site-specific BSAF of 4.84 and an average site-specific BSAF of 1.42 were derived for forage fish using this limited data set. The median and mid-point of range BSAFs were 1.06 and 1.1, respectively. Please note that the maximum site-specific BSAF of 13 recorded in Table 7-3 of the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment is incorrect. The site-specific BSAF of 1.42 calculated using average concentrations from a limited data set is within the range reported in the literature. Literature BSAFs for mercury in forage fish range from 0.61 mg/kg for mosquito fish, 0.7 to 1.4 for minnows and 1.4 to 2 for bluegill sunfish (November 12, 2002 Response to Agency Comments on Ecological Risk Assessment, Page 20). Higher BSAF values are reported in the literature for predator fish such as pike, however, these higher values are not appropriate for the type of fish (forage fish) that might be present in Dead Creek.

For the maximum site-specific BSAF of 4.84, the site-specific, risk-based concentration for creek bottom soils to protect fish from mercury uptake is 0.05 mg/kg. To put an RBC of 0.05 mg/kg into perspective, it is two to 20 times lower than the:

- **IEPA mean mercury background concentration for Illinois soils** **0.12 mg/kg**
- **Threshold Effects Concentration (TEC) Sediment Screening Level** **0.18 mg/kg**
- **Probable Effects Concentration (PEC) Sediment Screening Level** **1.06 mg/kg**

A BSAF of 4.84 and an RBC of 0.05 mg/kg results in potential unacceptable impacts to fish, and herons preying on the fish, along the entire 15,000 ft. length of Dead Creek between Queeny Avenue and the Borrow Pit Lake.

Using the average site-specific BSAF of 1.42, a creek bottom soil RBC of 0.18 mg/kg is needed to protect fish from mercury uptake. This RBC corresponds to the 0.18 mg/kg Threshold Effects Concentration (TEC) sediment screening level used in the November 12, 2002 Response to Agency Comments on Ecological Risk Assessment. To achieve this RBC, the following transects need to be isolated or removed:

Summary of Sampling Transects To Be Isolated or Removed to Achieve Site-Specific RBC for Mercury

CS-B	T0, T1, T2, T3, T6, T9, T11, T12 and T17
CS-C	T6
CS-D	T4 and T6
CS-E	T2, T6, T8, T9, T10, T11, T12, T13, T14, T15, T16 and T17
CS-F	T3, T5, T9 and T14

On this basis, 11,550 feet (77 percent) of the creek bottoms soils Dead Creek channel between Queeny Avenue and the Borrow Pit Lake would need to be lined or excavated to protect fish from mercury uptake.

Based on limited data, residual mercury concentrations in creek bottom soils create a potential problem that could impair future restoration of aquatic habitat in Dead Creek. As indicated below, mercury was detected in every creek bottom soil sample:

Summary of Maximum Total Mercury Concentrations in Creek Bottom Soils, mg/kg

Transect/ Sample	CS-B	CS-C	CS-D	CS-E	CS-F
0	**0.82**	NST	NST	NST	NST
1	**0.23**	0.046	0.14	0.11	0.12
2	**0.24**	0.06	0.11	**0.25**	0.074
3	**0.27**	0.046	0.07	0.11	**0.63**

4	0.099	0.13	**0.71**	0.083	0.038
5	0.054	0.074	0.065	0.094	**0.82**
6	**0.21**	**0.31**	**0.33**	**0.25**	0.14
7	0.12	NST	NST	0.12	0.086
8	0.15	NST	NST	**0.34**	0.09
9	**0.29**	NST	NST	**0.6**	**0.32**
10	0.16	NST	NST	**0.6**	0.11
11	**0.8**	NST	NST	**0.46**	0.093
12	**0.84**	NST	NST	**0.69**	0.031
13	0.096	NST	NST	**0.84**	0.018
14	0.032	NST	NST	**0.28**	**0.32**
15	0.064	NST	NST	**0.25**	0.17
16	0.12	NST	NST	**1.6**	0.04
17	**0.34**	NST	NST	**0.27**	NST
18	0.055	NST	NST	NST	NST

Notes: 1) **NST** = No Sampling Transect
2) **Bold** = Concentration greater than TEC/RBC of 0.18 mg/kg

Nearly half (28 of 44 or 44.7 percent) of the detected mercury concentrations in creek bottom soil are above the TEC/RBC concentration of 0.18 mg/kg. This indicates a potential for adverse impacts on the aquatic ecosystem in Dead Creek.

4.1.2 Performance Monitoring Plan

Fish tissue monitoring will be performed annually in Creek Segment F downstream of the Terminal Railroad Association Embankment to determine whether or not: 1) mercury present in creek bottom soils at concentrations above site-specific, risk-based concentrations is bioaccumulating in fish tissue, 2) concentration trends over time are upward, downward or stabile and 3) toxicity threshold values are exceeded. As discussed above, a storm water pumping system was installed in Creek Segments B, C, D and E to protect public health. As a consequence of this public health measure and normal dewatering/desiccation of the creek in response to annual precipitation patterns, potential habitat in Dead Creek conducive to a sustainable fish population is restricted to Creek Segment F downstream of the Terminal Railroad Association embankment. Therefore, it is considered appropriate to perform fish tissue sampling and mercury speciation analyses in those segments of Dead Creek that are conducive to a sustainable fish population.

In order to determine if mercury is bioaccumulating in forage fish, the 5200 feet length of Creek Segment F between the Terminal Railroad Association embankment and the Borrow Pit Lake will be divided into ten equal sections and isolated from each other using netting fine enough to prevent upstream or downstream movement of forage fish. Forage fish will be collected from each isolation section, one composite sample for each 500 ft. sampling section, and analyzed for Total and Methyl Mercury. A summary of the proposed monitoring program is given below:

Summary of Proposed Fish Tissue Performance Monitoring Program

- **Location** 10 - 500 ft. Long Isolation Sections in Creek Segment F
- **Frequency** Annual
- **Number of Samples** 10 Composites
- **Sample Media** Whole Body Forage Fish
- **Analytical Parameters** Total and Methyl Mercury
- **Analytical Methods** Total Mercury — Method 7471; Methyl Mercury — Method 1630 (Modified)
- **Performance Measures** Concentration Time Trends; Comparison to Fish Toxicity Thresholds: Mercury 0.8 mg/kg

Note: A whole body toxicity value for fathead minnows was used for the performance monitoring fish toxicity threshold. A toxicity threshold of 0.25 mg/kg would be appropriate if predator fish were the performance monitoring target species, however, predator fish are not likely to be present in Dead Creek.

Performance monitoring results will be evaluated at the end of five years to determine whether or not performance monitoring needs to continue. If monitored constituent concentrations are steady state, decreasing or below criteria, monitoring will be discontinued.

4.2 STORM WATER PERFORMANCE MONITORING

4.2.1 Rationale

Storm water monitoring is considered an appropriate performance measure because residual constituent concentrations in creek bottom soil may result in an adverse impact on benthic organisms if transported downstream to Creek Segment F and/or the Borrow Pit Lake at concentrations higher than ten times their Probable Effects Concentrations (PECs). Residual constituent concentrations in creek bottom soils exceed ten times the Probable Effects Concentration (PEC) at the following locations:

Summary of Sampling Transects with Creek Bottom Soil Concentrations > 10 Times PECs

CS-B	**T0**	**SVOCs**	Napthalene and 2-Methylnapthalene
		Pesticides	DDD and Heptachlor epoxide
		Total PCBs	
		Metals	Copper, Nickel and Zinc
	T1	**Metals**	Nickel
	T2	**Metals**	Copper
	T3	**SVOCs**	Bis(2-ethylhexyl)phthalate and 2-Methylnapthalene
		Total PCBs	
	T4	**Metals**	Zinc
	T8	**Metals**	Zinc
	T11	**Metals**	Cadmium, Nickel and zinc
	T12	**Metals**	Nickel and Zinc
	T16	**Metals**	Copper
CS-C	**T3**	**Metals**	Nickel
CS-D	**T1**	**Metals**	Zinc
	T2	**Metals**	Zinc
	T6	**Metals**	Copper and Nickel
CS-E	**T16**	**Metals**	Copper, Nickel and Zinc

CS-F	**T5**	**Metals**	Cadmium, Nickel and Zinc

4.2.2 Performance Monitoring Plan

Constituents in creek bottom soils that exceed ten times the PEC are from four analytical parameter groups: SVOCs, Pesticides, PCBs and Metals. To ensure that these constituents are not migrating via the surface water pathway during storm conditions, storm water samples will be collected at the outlets of Creek Segments B, C, D, E and F. Since PCBs, Dioxin and Mercury, the three bioaccumulative compounds associated with Sauget Area 1 source areas, are present as residual concentrations in creek bottom soils; they will be added to the monitoring parameter list. A summary of the proposed monitoring program is given below:

Summary of Proposed Storm Water Performance Monitoring Program

- **Location**
  - Creek Segment B Outlet
  - Creek Segment C Outlet
  - Creek Segment D Outlet
  - Creek Segment E Outlet
  - Creek Segment F Outlet
- **Frequency**
  - Quarterly for three years
  - Semi-Annual for two years
  - Annual after five years
- **Number of Samples**: 6
- **Sample Media**: Surface Water
- **Analytical Parameters**: SVOCs, Pesticides, PCBs and Cadmium, Copper, Lead, Nickel and Zinc
- **Analytical Methods**

SVOCs	Method 8270C
Pesticides	Method 8081A
PCBs	Method 680
Cadmium	Method 7131A
Copper	Method 7211
Lead	Method 7421
Nickel	Method 7521
Zinc	Method 7951

- **Performance Measures**
  - Concentration Time Trends

Comparison to PECs:	**Site-Related Bioaccumulatives**	
	PCBs	676 ug/kg
	Dioxin	No PEC Available
	Mercury	1,060 ug/kg
Comparison to PECs:	**Bioaccumulatives**	
	D,D,D	28 ug/kg
	Napthalene	561 ug/kg
	Heptachlor epoxide	16 ug/kg
Comparison to 10(PECs):	**Organic Non-Bioaccumulatives**	
	Bis(2-ethylhexyl)phthalate	2,640 ug/kg
	2-Methylnapthalene	201 ug/kg
Comparison to 10(PECs):	**Inorganic Non-Bioaccumulatives**	
	Cadmium	4,980 ug/kg
	Copper	149,000 ug/kg
	Nickel	490 ug/kg
	Lead	1,280 ug/kg
	Zinc	4,590 ug/kg

Performance monitoring results will be evaluated at the end of five years to determine whether or not performance monitoring needs to continue. If monitored constituent concentrations are steady state, decreasing or below criteria, monitoring will be discontinued.

4.3 GROUNDWATER PERFORMANCE MONITORING

4.3.1 Rationale

Groundwater monitoring is considered an appropriate performance measure because of the potential for residual cadmium concentrations to leach from creek bottom soils to groundwater.

4.3.2 Performance Monitoring Plan

To determine whether or not cadmium is leaching from creek bottom soils to groundwater, one monitoring well will be installed in each creek segment at the location with the highest cadmium concentrations in groundwater as determined by the soil to groundwater leaching investigation described above. Monitoring wells, which will be located on the center line of the Dead Creek channel, will have ten foot long screens located from 10 to 20 ft. below the surface of adjacent flood plain. Screens placed at this depth will cover the expected range of groundwater levels, which are normally within 10 to 15 feet of ground surface (bgs). Under dry conditions, depth to groundwater can be as deep as 20 ft. below ground surface. Samples from each well will be analyzed for Cadmium to determine if residual cadmium is leaching from creek bottom soils. A summary of the proposed monitoring program is given below:

Summary of Proposed Groundwater Performance Monitoring Program

• **Location**	Creek Segment B Creek Segment C Creek Segment D Creek Segment E Creek Segment F	
• **Frequency**	Quarterly for three years Semiannual for two years Annual after five years	
• **Number of Samples**	5	
• **Sample Media**	Groundwater	
• **Analytical Parameters**	Cadmium	
• **Analytical Methods**	Cadmium	Method 7131A
• **Performance Measures**	Concentration Time Trends Comparison to Class I Groundwater Standard	 5 ug/l

Performance monitoring results will be evaluated at the end of five years to determine whether or not performance monitoring needs to continue. If monitored constituent concentrations are steady state, decreasing or below criteria, monitoring will be discontinued.

A[redacted]

ECOLOGICAL RIS[redacted]IENT SUMMARY

Ecological Risk Assessment Summary

	F.F. BP COMP 1				F.F. BP COMP 2			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
1,1,1-Trichloroethane	NA	NA	0		NA	NA	0	
1,1,2,2-Tetrachloroethane	NA	NA	0		NA	NA	0	
1,1,2-Trichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethene	NA	NA	0		NA	NA	0	
1,2,3,4,6,7,8,9-OCDD	0.000645	0.00208	100	17.25	0.00195	0.00523	100	17.25
1,2,3,4,6,7,8,9-OCDF	0.008	0.0258	100	0.756	ND	ND	100	0.756
1,2,3,4,6,7,8-HpCDD	0.00325	0.0105	100	0.443	0.00488	0.0131	100	0.443
1,2,3,4,6,7,8-HpCDF	0.00885	0.0285	100	0.159	ND	ND	100	0.159
1,2,3,4,7,8,9-HpCDF	0.0624	0.201	100	0.0117	ND	ND	100	0.0117
1,2,3,4,7,8-HxCDD	ND	ND	67	0.0049	ND	ND	67	0.0049
1,2,3,4,7,8-HxCDF	0.108	0.347	100	0.0082	ND	ND	100	0.0082
1,2,3,6,7,8-HxCDD	0.0484	0.156	100	0.0182	ND	ND	100	0.0182
1,2,3,6,7,8-HxCDF	ND	ND	100	0.0059	ND	ND	100	0.0059
1,2,3,7,8,9-HxCDD	ND	ND	100	0.0173	ND	ND	100	0.0173
1,2,3,7,8,9-HxCDF	ND	ND	100	0.008	ND	ND	100	0.008
1,2,3,7,8-PeCDD	ND	ND	100	0.0035	ND	ND	100	0.0035
1,2,3,7,8-PeCDF	ND	ND	67	0.0027	ND	ND	67	0.0027
1,2,4-Trichlorobenzene	ND	ND	0		ND	ND	0	
1,2-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,2-Dichloroethane	NA	NA	0		NA	NA	0	
1,2-Dichloropropane	NA	NA	0		NA	NA	0	
1,3-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,4-Dichlorobenzene	ND	ND	0		ND	ND	0	
2,2'-Oxybis(1-chloropropane)_bis(	ND	ND	0		ND	ND	0	
2,3,4,6,7,8-HxCDF	ND	ND	100	0.0073	ND	ND	100	0.0073
2,3,4,7,8-PeCDF	0.125	0.403	100	0.0042	ND	ND	100	0.0042
2,3,7,8-TCDD	0 134	0.432	100	0.0122	ND	ND	100	0.0122
2,3,7,8-TCDF	0.909	2.93	100	0.01015	0.536	1.44	100	0.01015
2,4,5-T	ND	ND	0		ND	ND	0	
2,4,5-TP (Silvex)	ND	ND	0		ND	ND	0	
2,4,5-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4,6-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4-D	ND	ND	67	11	ND	ND	67	11
2,4-DB	0.855	2.75	0		0.556	1.49	0	
2,4-Dichlorophenol	ND	ND	0		ND	ND	0	
2,4-Dimethylphenol	ND	ND	0		ND	ND	0	
2,4-Dinitrophenol	ND	ND	0		ND	ND	0	
2,4-Dinitrotoluene	ND	ND	0		ND	ND	0	
2,6-Dinitrotoluene	ND	ND	0		ND	ND	0	
2-Chloronaphthalene	ND	ND	0		ND	ND	0	
2-Chlorophenol	ND	ND	0		ND	ND	0	
2-Hexanone	NA	NA	0		NA	NA	0	
2-Methylnaphthalene	ND	ND	0		ND	ND	0	
2-Methylphenol (o-cresol)	ND	ND	0		ND	ND	0	
2-Nitroaniline	ND	ND	0		ND	ND	0	
2-Nitrophenol	ND	ND	0		ND	ND	0	
3,3'-Dichlorobenzidine	ND	ND	0		ND	ND	0	
3&4-Methylphenol (m&p-cresol)	ND	ND	0		ND	ND	0	
3-Nitroaniline	ND	ND	0		ND	ND	0	
4,4'-DDD	ND	ND	0		ND	ND	0	
4,4'-DDE	2.08	6.7	100	3.2	4.62	12.4	100	3.2
4,4'-DDT	ND	ND	67	1.4	ND	ND	67	1.4
4,6-Dinitro-2-methylphenol	ND	ND	0		ND	ND	0	
4-Bromophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Chloro-3-methylphenol	ND	ND	0		ND	ND	0	
4-Chloroaniline	ND	ND	0		ND	ND	0	
4-Chlorophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Methyl-2-pentanone (MIBK)	NA	NA	0		NA	NA	0	
4-Nitroaniline	ND	ND	0		ND	ND	0	
4-Nitrophenol	ND	ND	0		ND	ND	0	
Acenaphthene	ND	ND	0		ND	ND	0	
Acenaphthylene	ND	ND	0		ND	ND	0	
Acetone	NA	NA	0		NA	NA	0	
Aldrin	ND	ND	0		ND	ND	0	
Alpha Chlordane	ND	ND	100	3.2	ND	ND	100	3.2
alpha-BHC	ND	ND	0		ND	ND	0	
Aluminum	0.00175	0.00564	100	16000	0.0038	0.0102	100	16000
Anthracene	ND	ND	0		ND	ND	0	
Antimony	ND	ND	67	1.9	ND	ND	67	1.9
Arsenic	ND	ND	100	17	ND	ND	100	17
Barium	NA	NA	100	420	NA	NA	100	420
Benzene	NA	NA	0		NA	NA	0	
Benzo(a)anthracene	ND	ND	0		ND	ND	0	
Benzo(a)pyrene	ND	ND	0		ND	ND	0	
Benzo(b)fluoranthene	ND	ND	0		ND	ND	0	
Benzo(g,h,i)perylene	ND	ND	0		ND	ND	0	
Benzo(k)fluoranthene	ND	ND	0		ND	ND	0	
Beryllium	ND	ND	100	0.82	ND	ND	100	0.82
beta-BHC	ND	ND	0		ND	ND	0	
bis(2-Chloroethoxy)methane	ND	ND	0		ND	ND	0	
bis(2-Chloroethyl)ether	ND	ND	0		ND	ND	0	
bis(2-Ethylhexyl)phthalate	0.625	2.01	0		0.958	2.57	0	
Bromodichloromethane	NA	NA	0		NA	NA	0	
Bromoform	NA	NA	0		NA	NA	0	

	F.F. BP COMP 1				F.F. BP COMP 2			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
Bromomethane (Methyl bromide)	NA	NA	0		NA	NA	0	
Butylbenzylphthalate	ND	ND	0		ND	ND	0	
Cadmium	ND	ND	100	2.7	ND	ND	100	2.7
Calcium	NA	NA	100	16500	NA	NA	100	16500
Carbazole	ND	ND	0		ND	ND	0	
Carbon disulfide	NA	NA	0		NA	NA	0	
Carbon tetrachloride	NA	NA	0		NA	NA	0	
Chlorobenzene	NA	NA	0		NA	NA	0	
Chloroethane	NA	NA	0		NA	NA	0	
Chloroform	NA	NA	0		NA	NA	0	
Chloromethane	NA	NA	0		NA	NA	0	
Chromium	0.0147	0.0475	100	26	0.0138	0.0371	100	26
Chrysene	ND	ND	0		ND	ND	0	
Cis/Trans-1,2-Dichloroethene	NA	NA	0		NA	NA	0	
cis-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Cobalt	NA	NA	100	10	NA	NA	100	10
Copper	0.0103	0.0332	100	64	0.0161	0.0432	100	64
Cyanide, Total	ND	ND	0		ND	ND	0	
Dalapon	ND	ND	0		ND	ND	0	
Decachlorobiphenyl	ND	ND	0		ND	ND	0	
delta-BHC	ND	ND	0		ND	ND	0	
Dibenzo(a,h)anthracene	ND	ND	0		0.378	1.01	0	
Dibenzofuran	ND	ND	0		ND	ND	0	
Dibromochloromethane	NA	NA	0		NA	NA	0	
Dicamba	0.0922	0.297	0		ND	ND	0	
Dichlorobiphenyl	ND	ND	0		ND	ND	0	
Dichloroprop	0.0479	0.154	0		ND	ND	0	
Dieldrin	ND	ND	67	0.5	ND	ND	67	0.5
Diethylphthalate	0.0792	0.255	0		0.154	0.414	0	
Dimethylphthalate	ND	ND	0		ND	ND	0	
Di-n-butylphthalate	ND	ND	0		ND	ND	0	
Di-n-octylphthalate	ND	ND	0		ND	ND	0	
Dinoseb	ND	ND	0		ND	ND	0	
Endosulfan I	ND	ND	100	2.8	ND	ND	100	2.8
Endosulfan II	ND	ND	0		ND	ND	0	
Endosulfan sulfate	ND	ND	67	1.4	ND	ND	67	1.4
Endrin	ND	ND	0		ND	ND	0	
Endrin aldehyde	ND	ND	100	2.2	ND	ND	100	2.2
Endrin ketone	ND	ND	33	0.715	ND	ND	33	0.715
Ethylbenzene	NA	NA	0		NA	NA	0	
Fluoranthene	ND	ND	0		ND	ND	0	
Fluorene	ND	ND	0		ND	ND	0	
Gamma Chlordane	ND	ND	67	3	ND	ND	67	3
gamma-BHC (Lindane)	ND	ND	33	0.16	ND	ND	33	0.16
Heptachlor	ND	ND	0		ND	ND	0	
Heptachlor epoxide	ND	ND	33	0.2	ND	ND	33	0.2
Heptachlorobiphenyl	ND	ND	0		ND	ND	0	
Hexachlorobenzene	ND	ND	0		ND	ND	0	
Hexachlorobiphenyl	2.26	7.33	0		1.96	5.27	0	
Hexachlorobutadiene	ND	ND	0		ND	ND	0	
Hexachlorocyclopentadiene	ND	ND	0		ND	ND	0	
Hexachloroethane	ND	ND	0		ND	ND	0	
Indeno(1,2,3-cd)pyrene	ND	ND	0		0.225	0.604	0	
Iron	NA	NA	100	38000	NA	NA	100	38000
Isophorone	ND	ND	0		ND	ND	0	
Lead	ND	ND	100	58	ND	ND	100	58
Magnesium	NA	NA	100	5600	NA	NA	100	5600
Manganese	NA	NA	100	1400	NA	NA	100	1400
MCPA_(4-chloro-2-methylphenox	1.1	3.54	0		1.17	3.14	0	
MCPP_2-(4-chloro-2-methylphenc	ND	ND	0		ND	ND	0	
Mercury	0.419	1.35	100	0.16	4.84	13	100	0.16
Methoxychlor	ND	ND	0		ND	ND	0	
Methylene chloride (Dichlorometh	NA	NA	0		NA	NA	0	
Molybdenum	NA	NA	100	0.92	NA	NA	100	0.92
Monochlorobiphenyl	ND	ND	0		ND	ND	0	
Naphthalene	ND	ND	0		ND	ND	0	
Nickel	ND	ND	100	54	ND	ND	100	54
Nitrobenzene	ND	ND	0		ND	ND	0	
n-Nitrosodi-n-propylamine	ND	ND	0		ND	ND	0	
N-Nitrosodiphenylamine/Diphenyla	ND	ND	0		ND	ND	0	
Nonachlorobiphenyl	ND	ND	0		ND	ND	0	
Octachlorobiphenyl	ND	ND	0		ND	ND	0	
Pentachlorobiphenyl	0.9	2.9	0		ND	ND	0	
Pentachlorophenol	0.00272	0.00877	0		0.00124	0.00332	0	
pH	NA	NA	100	7.06	NA	NA	100	7.06
Phenanthrene	ND	ND	0		ND	ND	0	
Phenol	ND	ND	0		ND	ND	0	
Potassium	NA	NA	100	2200	NA	NA	100	2200
Pyrene	ND	ND	0		ND	ND	0	
Selenium	0.394	1.27	0		ND	ND	0	
Silver	ND	ND	33	0.79	ND	ND	33	0.79
Sodium	NA	NA	0		NA	NA	0	
Styrene	NA	NA	0		NA	NA	0	
Tetrachlorobiphenyl	ND	ND	0		ND	ND	0	
Tetrachloroethene	NA	NA	0		NA	NA	0	
Thallium	NA	NA	0		NA	NA	0	
Toluene	NA	NA	0		NA	NA	0	
Toxaphene	ND	ND	0		ND	ND	0	
trans-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Trichlorobiphenyl	ND	ND	0		ND	ND	0	
Trichloroethene	NA	NA	0		NA	NA	0	
Vanadium	NA	NA	100	40	NA	NA	100	40
Vinyl chloride	NA	NA	0		NA	NA	0	
Xylenes, Total	NA	NA	0		NA	NA	0	
Zinc	0.0779	0.251	100	370	0.107	0.288	100	370

Compounds	F.F. BP COMP 1				F.F. BP COMP 2			
	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration

	F.F. BP COMP 3				F.F. CS B COMP 1			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
1,1,1-Trichloroethane	NA	NA	0		NA	NA	0	
1,1,2,2-Tetrachloroethane	NA	NA	0		NA	NA	0	
1,1,2-Trichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethene	NA	NA	0		NA	NA	0	
1,2,3,4,6,7,8,9-OCDD	0.00172	0.00521	100	17.25	0.000718	0.00527	100	3420
1,2,3,4,6,7,8,9-OCDF	0.00236	0.00714	100	0.756	0.000818	0.006	100	1130
1,2,3,4,6,7,8-HpCDD	0.00434	0.0131	100	0.443	0.000815	0.00598	100	397
1,2,3,4,6,7,8-HpCDF	ND	ND	100	0.159	0.000842	0.00618	100	188
1,2,3,4,7,8,9-HpCDF	ND	ND	100	0.0117	0.000882	0.00647	100	13.1
1,2,3,4,7,8-HxCDD	ND	ND	67	0.0049	0.00323	0.0237	100	2.31
1,2,3,4,7,8-HxCDF	0.0573	0.173	100	0.0092	0.00226	0.0166	100	6.41
1,2,3,6,7,8-HxCDD	ND	ND	100	0.0162	0.00379	0.0278	100	13.2
1,2,3,6,7,8-HxCDF	ND	ND	100	0.0059	0.00236	0.0173	100	2.54
1,2,3,7,8,9-HxCDD	ND	ND	100	0.0173	0.0019	0.014	100	7.54
1,2,3,7,8,9-HxCDF	ND	ND	100	0.006	ND	ND	100	0.119
1,2,3,7,8-PeCDD	ND	ND	100	0.0035	0.0149	0.109	100	1.97
1,2,3,7,8-PeCDF	ND	ND	67	0.0027	0.00922	0.0678	100	0.842
1,2,4-Trichlorobenzene	ND	ND	0		ND	ND	33	770
1,2-Dichlorobenzene	ND	ND	0		ND	ND	33	370
1,2-Dichloroethane	NA	NA	0		NA	NA	0	
1,2-Dichloropropane	NA	NA	0		NA	NA	0	
1,3-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,4-Dichlorobenzene	ND	ND	0		ND	ND	67	1000
2,2'-Oxybis(1-chloropropane)_bis(2	ND	ND	0		ND	ND	0	
2,3,4,6,7,8-HxCDF	ND	ND	100	0.0073	0.00233	0.0171	100	3.91
2,3,4,7,8-PeCDF	ND	ND	100	0.0042	0.0139	0.102	100	1.28
2,3,7,8-TCDD	ND	ND	100	0.0122	0.0707	0.519	33	0.264
2,3,7,8-TCDF	0.606	1.83	100	0.01015	0.179	1.31	100	0.611
2,4,5-T	ND	ND	0		NA	NA	0	
2,4,5-TP (Silvex)	ND	ND	0		NA	NA	0	
2,4,5-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4,6-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4-D	ND	ND	67	11	NA	NA	0	
2,4-DB	ND	ND	0		NA	NA	0	
2,4-Dichlorophenol	ND	ND	0		ND	ND	0	
2,4-Dimethylphenol	ND	ND	0		ND	ND	0	
2,4-Dinitrophenol	ND	ND	0		ND	ND	0	
2,4-Dinitrotoluene	ND	ND	0		ND	ND	0	
2,6-Dinitrotoluene	ND	ND	0		ND	ND	0	
2-Chloronaphthalene	ND	ND	0		ND	ND	0	
2-Chlorophenol	ND	ND	0		ND	ND	0	
2-Hexanone	NA	NA	0		NA	NA	33	21
2-Methylnaphthalene	ND	ND	0		ND	ND	0	
2-Methylphenol (o-cresol)	ND	ND	0		ND	ND	0	
2-Nitroaniline	ND	ND	0		ND	ND	0	
2-Nitrophenol	ND	ND	0		ND	ND	0	
3,3'-Dichlorobenzidine	ND	ND	0		ND	ND	0	
3&4-Methylphenol (m&p-cresol)	ND	ND	0		ND	ND	0	
3-Nitroaniline	ND	ND	0		ND	ND	0	
4,4'-DDD	ND	ND	0		NA	NA	33	150
4,4'-DDE	5.08	15.3	100	3.2	NA	NA	0	
4,4'-DDT	ND	ND	67	1.4	NA	NA	0	
4,6-Dinitro-2-methylphenol	ND	ND	0		ND	ND	0	
4-Bromophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Chloro-3-methylphenol	ND	ND	0		ND	ND	0	
4-Chloroaniline	ND	ND	0		ND	ND	33	630
4-Chlorophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Methyl-2-pentanone (MIBK)	NA	NA	0		NA	NA	0	
4-Nitroaniline	ND	ND	0		ND	ND	0	
4-Nitrophenol	ND	ND	0		ND	ND	0	
Acenaphthene	ND	ND	0		ND	ND	0	
Acenaphthylene	ND	ND	0		ND	ND	0	
Acetone	NA	NA	0		NA	NA	0	
Aldrin	ND	ND	0		NA	NA	100	1100
Alpha Chlordane	ND	ND	100	3.2	NA	NA	0	
alpha-BHC	ND	ND	0		NA	NA	0	
Aluminum	0.00321	0.0097	100	16000	0.00109	0.00803	100	12000
Anthracene	ND	ND	0		ND	ND	0	
Antimony	ND	ND	67	1.9	ND	ND	100	8.9
Arsenic	ND	ND	100	17	ND	ND	100	38
Barium	NA	NA	100	420	NA	NA	100	3300
Benzene	NA	NA	0		NA	NA	0	
Benzo(a)anthracene	ND	ND	0		ND	ND	100	870
Benzo(a)pyrene	ND	ND	0		ND	ND	100	1200
Benzo(b)fluoranthene	ND	ND	0		ND	ND	100	2000
Benzo(g,h,i)perylene	ND	ND	0		ND	ND	100	1600
Benzo(k)fluoranthene	ND	ND	0		ND	ND	100	1600
Beryllium	ND	ND	100	0.82	ND	ND	0	
beta-BHC	ND	ND	0		NA	NA	0	
bis(2-Chloroethoxy)methane	ND	ND	0		ND	ND	0	
bis(2-Chloroethyl)ether	ND	ND	0		ND	ND	0	
bis(2-Ethylhexyl)phthalate	ND	ND	0		ND	ND	33	3000
Bromodichloromethane	NA	NA	0		NA	NA	0	
Bromoform	NA	NA	0		NA	NA	0	

	F.F. BP COMP 3				F.F. CS B COMP 1			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
Bromomethane (Methyl bromide)	NA	NA	0		NA	NA	0	
Butylbenzylphthalate	ND	ND	0		ND	ND	0	
Cadmium	ND	ND	100	2.7	ND	ND	100	25
Calcium	NA	NA	100	16500	NA	NA	100	180000
Carbazole	ND	ND	0		ND	ND	0	
Carbon disulfide	NA	NA	0		NA	NA	0	
Carbon tetrachloride	NA	NA	0		NA	NA	0	
Chlorobenzene	NA	NA	0		NA	NA	100	51.5
Chloroethane	NA	NA	0		NA	NA	0	
Chloroform	NA	NA	0		NA	NA	0	
Chloromethane	NA	NA	0		NA	NA	0	
Chromium	0.012	0.0362	100	26	0.00613	0.045	100	78
Chrysene	ND	ND	0		ND	ND	100	1800
Cis/Trans-1,2-Dichloroethene	NA	NA	0		NA	NA	0	
cis-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Cobalt	NA	NA	100	10	NA	NA	100	12
Copper	0.0351	0.108	100	64	0.0012	0.00878	100	11000
Cyanide, Total	ND	ND	0		ND	ND	0	
Dalapon	ND	ND	0		NA	NA	0	
Decachlorobiphenyl	ND	ND	0		ND	ND	67	3400
delta-BHC	ND	ND	0		NA	NA	0	
Dibenzo(a,h)anthracene	ND	ND	0		ND	ND	0	
Dibenzofuran	ND	ND	0		ND	ND	0	
Dibromochloromethane	NA	NA	0		NA	NA	0	
Dicamba	ND	ND	0		NA	NA	0	
Dichlorobiphenyl	ND	ND	0		ND	ND	67	640
Dichloroprop	ND	ND	0		NA	NA	0	
Dieldrin	ND	ND	67	0.5	NA	NA	0	
Diethylphthalate	0.15	0.453	0		0.0689	0.505	0	
Dimethylphthalate	ND	ND	0		ND	ND	0	
Di-n-butylphthalate	ND	ND	0		ND	ND	0	
Di-n-octylphthalate	ND	ND	0		ND	ND	0	
Dinoseb	ND	ND	0		NA	NA	0	
Endosulfan I	ND	ND	100	2.8	NA	NA	0	
Endosulfan II	ND	ND	0		NA	NA	0	
Endosulfan sulfate	ND	ND	67	1.4	NA	NA	100	130
Endrin	ND	ND	0		NA	NA	0	
Endrin aldehyde	ND	ND	100	2.2	NA	NA	33	520
Endrin ketone	ND	ND	33	0.715	NA	NA	0	
Ethylbenzene	NA	NA	0		NA	NA	0	
Fluoranthene	ND	ND	0		ND	ND	100	2000
Fluorene	ND	ND	0		ND	ND	0	
Gamma Chlordane	ND	ND	67	3	NA	NA	33	720
gamma-BHC (Lindane)	ND	ND	33	0.16	NA	NA	0	
Heptachlor	ND	ND	0		NA	NA	33	500
Heptachlor epoxide	ND	ND	33	0.2	NA	NA	33	0.2
Heptachlorobiphenyl	ND	ND	0		0.182	1.33	100	5300
Hexachlorobenzene	ND	ND	0		ND	ND	0	
Hexachlorobiphenyl	ND	ND	0		0.0926	0.679	100	21000
Hexachlorobutadiene	ND	ND	0		ND	ND	0	
Hexachlorocyclopentadiene	ND	ND	0		ND	ND	0	
Hexachloroethane	ND	ND	0		ND	ND	0	
Indeno(1,2,3-cd)pyrene	ND	ND	0		ND	ND	67	1300
Iron	NA	NA	100	38000	NA	NA	100	29000
Isophorone	ND	ND	0		ND	ND	0	
Lead	0.0123	0.0373	100	56	0.00143	0.0105	100	1000
Magnesium	NA	NA	100	5800	NA	NA	100	20000
Manganese	NA	NA	100	1400	NA	NA	100	245
MCPA_(4-chloro-2-methylphenoxy	ND	ND	0		NA	NA	0	
MCPP_2-(4-chloro-2-methylphenc	ND	ND	0		NA	NA	0	
Mercury	ND	ND	100	0.16	ND	ND	100	1.5
Methoxychlor	ND	ND	0		NA	NA	0	
Methylene chloride (Dichlorometh	NA	NA	0		NA	NA	0	
Molybdenum	NA	NA	100	0.92	NA	NA	100	7
Monochlorobiphenyl	ND	ND	0		ND	ND	0	
Naphthalene	ND	ND	0		ND	ND	33	380
Nickel	ND	ND	100	54	ND	ND	100	500
Nitrobenzene	ND	ND	0		ND	ND	0	
n-Nitrosodi-n-propylamine	ND	ND	0		ND	ND	0	
N-Nitrosodiphenylamine/Diphenyla	ND	ND	0		ND	ND	0	
Nonachlorobiphenyl	ND	ND	0		ND	ND	0	
Octachlorobiphenyl	ND	ND	0		0.111	0.815	33	1800
Pentachlorobiphenyl	ND	ND	0		0.0595	0.436	100	66000
Pentachlorophenol	ND	ND	0		ND	ND	100	220
pH	NA	NA	100	7.06	NA	NA	100	6.72
Phenanthrene	ND	ND	0		ND	ND	100	830
Phenol	ND	ND	0		ND	ND	0	
Potassium	NA	NA	100	2200	NA	NA	100	2400
Pyrene	ND	ND	0		ND	ND	100	2400
Selenium	0.387	1.17	0		ND	ND	100	5.1
Silver	ND	ND	33	0.79	ND	ND	100	15
Sodium	NA	NA	0		NA	NA	0	
Styrene	NA	NA	0		NA	NA	0	
Tetrachlorobiphenyl	ND	ND	0		0.0547	0.401	100	98000
Tetrachloroethene	NA	NA	0		NA	NA	0	
Thallium	NA	NA	0		NA	NA	33	2.1
Toluene	NA	NA	0		NA	NA	33	20
Toxaphene	ND	ND	0		NA	NA	0	
trans-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Trichlorobiphenyl	ND	ND	0		0.0299	0.219	100	30000
Trichloroethene	NA	NA	0		NA	NA	0	
Vanadium	NA	NA	100	40	NA	NA	100	41
Vinyl chloride	NA	NA	0		NA	NA	0	
Xylenes, Total	NA	NA	0		NA	NA	0	
Zinc	0.104	0.314	100	370	0.00952	0.0699	100	7900

	F.F. BP COMP 3				F.F. CS B COMP 1			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration

Compounds	F.F. CS-D COMP 1 BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	F.F. REF 1 COMP 1 BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
1,1,1-Trichloroethane	NA	NA	0		NA	NA	0	
1,1,2,2-Tetrachloroethane	NA	NA	0		NA	NA	0	
1,1,2-Trichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethene	NA	NA	0		NA	NA	0	
1,2,3,4,6,7,8,9-OCDD	0.00132	0.006	100	209	0.0053	0.00357	100	4.95
1,2,3,4,6,7,8,9-OCDF	0.00102	0.00462	100	64	0.0121	0.00816	100	0.136
1,2,3,4,6,7,8-HpCDD	0.00157	0.00711	100	21.5	0.0113	0.00762	100	0.162
1,2,3,4,6,7,8-HpCDF	0.00158	0.00719	100	12.1	ND	ND	100	0.0307
1,2,3,4,7,8,9-HpCDF	0.00263	0.0119	100	0.636	ND	ND	50	0.003
1,2,3,4,7,8-HxCDD	0.012	0.0546	100	0.107	ND	ND	100	0.0018
1,2,3,4,7,8-HxCDF	0.0119	0.0536	100	0.297	0.207	0.139	50	0.0029
1,2,3,6,7,8-HxCDD	0.0145	0.0657	100	0.587	0.129	0.0866	100	0.0046
1,2,3,6,7,8-HxCDF	0.0068	0.0309	100	0.178	ND	ND	0	
1,2,3,7,8,9-HxCDD	0.00529	0.024	100	0.363	ND	ND	100	0.0048
1,2,3,7,8,9-HxCDF	ND	ND	100	0.009	ND	ND	0	
1,2,3,7,8-PeCDD	0.0449	0.204	100	0.0611	ND	ND	0	
1,2,3,7,8-PeCDF	ND	ND	100	0.0575	ND	ND	0	
1,2,4-Trichlorobenzene	ND	ND	0		ND	ND	0	
1,2-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,2-Dichloroethane	NA	NA	0		NA	NA	0	
1,2-Dichloropropane	NA	NA	0		NA	NA	0	
1,3-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,4-Dichlorobenzene	ND	ND	0		ND	ND	0	
2,2'-Oxybis(1-chloropropane)_bis(	ND	ND	0		ND	ND	0	
2,3,4,6,7,8-HxCDF	0.00688	0.0312	100	0.233	ND	ND	50	0.0016
2,3,4,7,8-PeCDF	0.0415	0.188	100	0.0792	ND	ND	0	
2,3,7,8-TCDD	0.247	1.12	33	0.0134	0.222	0.15	100	0.0035
2,3,7,8-TCDF	0.37	1.68	100	0.0663	2.22	1.5	100	0.0014
2,4,5-T	ND	ND	0		ND	ND	0	
2,4,5-TP (Silvex)	ND	ND	0		ND	ND	0	
2,4,5-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4,6-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4-D	ND	ND	0		ND	ND	50	12
2,4-DB	ND	ND	0		1.08	0.728	0	
2,4-Dichlorophenol	ND	ND	0		ND	ND	0	
2,4-Dimethylphenol	ND	ND	0		ND	ND	0	
2,4-Dinitrophenol	ND	ND	0		ND	ND	0	
2,4-Dinitrotoluene	ND	ND	0		ND	ND	0	
2,6-Dinitrotoluene	ND	ND	100	65	ND	ND	50	40
2-Chloronaphthalene	ND	ND	0		ND	ND	0	
2-Chlorophenol	ND	ND	0		ND	ND	0	
2-Hexanone	NA	NA	0		NA	NA	0	
2-Methylnaphthalene	ND	ND	0		ND	ND	0	
2-Methylphenol (o-cresol)	ND	ND	0		ND	ND	0	
2-Nitroaniline	ND	ND	0		ND	ND	0	
2-Nitrophenol	ND	ND	0		ND	ND	0	
3,3'-Dichlorobenzidine	ND	ND	0		ND	ND	0	
3&4-Methylphenol (m&p-cresol)	ND	ND	0		ND	ND	0	
3-Nitroaniline	ND	ND	0		ND	ND	0	
4,4'-DDD	ND	ND	0		ND	ND	0	
4,4'-DDE	ND	ND	100	20	0.959	0.645	0	
4,4'-DDT	ND	ND	0		ND	ND	0	
4,6-Dinitro-2-methylphenol	ND	ND	0		ND	ND	0	
4-Bromophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Chloro-3-methylphenol	ND	ND	0		ND	ND	0	
4-Chloroaniline	ND	ND	0		ND	ND	0	
4-Chlorophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Methyl-2-pentanone (MIBK)	NA	NA	0		NA	NA	0	
4-Nitroaniline	ND	ND	0		ND	ND	0	
4-Nitrophenol	ND	ND	0		ND	ND	0	
Acenaphthene	ND	ND	0		ND	ND	0	
Acenaphthylene	ND	ND	0		ND	ND	0	
Acetone	NA	NA	100	190	NA	NA	50	180
Aldrin	ND	ND	100	11	ND	ND	0	
Alpha Chlordane	ND	ND	67	26	ND	ND	0	
alpha-BHC	ND	ND	0		ND	ND	0	
Aluminum	0.00157	0.00713	100	19000	0.000963	0.000648	100	15000
Anthracene	ND	ND	0		ND	ND	0	
Antimony	ND	ND	0		ND	ND	50	1.3
Arsenic	ND	ND	100	17	ND	ND	100	8
Barium	NA	NA	100	400	NA	NA	100	230
Benzene	NA	NA	0		NA	NA	0	
Benzo(a)anthracene	ND	ND	33	420	ND	ND	0	
Benzo(a)pyrene	ND	ND	33	560	ND	ND	0	
Benzo(b)fluoranthene	ND	ND	100	970	ND	ND	0	
Benzo(g,h,i)perylene	ND	ND	33	960	ND	ND	0	
Benzo(k)fluoranthene	ND	ND	100	980	ND	ND	0	
Beryllium	ND	ND	0		ND	ND	100	0.8
beta-BHC	ND	ND	0		ND	ND	0	
bis(2-Chloroethoxy)methane	ND	ND	0		ND	ND	0	
bis(2-Chloroethyl)ether	ND	ND	0		ND	ND	0	
bis(2-Ethylhexyl)phthalate	0.0684	0.311	33	1200	0.904	0.609	0	
Bromodichloromethane	NA	NA	0		NA	NA	0	
Bromoform	NA	NA	0		NA	NA	0	

Compounds	F.F. CS-D COMP 1 BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	F.F. REF 1 COMP 1 BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
Bromomethane (Methyl bromide)	NA	NA	0		NA	NA	0	
Butylbenzylphthalate	ND	ND	0		ND	ND	0	
Cadmium	ND	ND	100	15	ND	ND	100	0.39
Calcium	NA	NA	100	30000	NA	NA	100	18000
Carbazole	ND	ND	0		ND	ND	0	
Carbon disulfide	NA	NA	0		NA	NA	0	
Carbon tetrachloride	NA	NA	0		NA	NA	0	
Chlorobenzene	NA	NA	0		NA	NA	0	
Chloroethane	NA	NA	0		NA	NA	0	
Chloroform	NA	NA	0		NA	NA	0	
Chloromethane	NA	NA	0		NA	NA	0	
Chromium	0.00607	0.0275	100	67	0.0126	0.0085	100	21
Chrysene	ND	ND	100	790	ND	ND	0	
Cis/Trans-1,2-Dichloroethene	NA	NA	0		NA	NA	0	
cis-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Cobalt	NA	NA	100	12	NA	NA	100	9.8
Copper	0.00251	0.0114	100	740	0.0243	0.0164	100	20
Cyanide, Total	ND	ND	0		ND	ND	0	
Dalapon	ND	ND	0		ND	ND	0	
Decachlorobiphenyl	ND	ND	67	230	ND	ND	0	
delta-BHC	ND	ND	67	16	ND	ND	0	
Dibenzo(a,h)anthracene	0.0206	0.0933	0		ND	ND	0	
Dibenzofuran	ND	ND	0		ND	ND	0	
Dibromochloromethane	NA	NA	0		NA	NA	0	
Dicamba	ND	ND	33	13	ND	ND	0	
Dichlorobiphenyl	ND	ND	0		ND	ND	0	
Dichloroprop	ND	ND	0		0.0451	0.0304	0	
Dieldrin	ND	ND	0		1.29	0.867	0	
Diethylphthalate	0.0111	0.0504	0		0.0957	0.0644	0	
Dimethylphthalate	ND	ND	0		ND	ND	0	
Di-n-butylphthalate	ND	ND	0		ND	ND	0	
Di-n-octylphthalate	ND	ND	0		ND	ND	0	
Dinoseb	ND	ND	0		ND	ND	0	
Endosulfan I	ND	ND	0		ND	ND	0	
Endosulfan II	ND	ND	0		ND	ND	0	
Endosulfan sulfate	ND	ND	0		ND	ND	0	
Endrin	ND	ND	0		ND	ND	0	
Endrin aldehyde	ND	ND	33	16	ND	ND	0	
Endrin ketone	ND	ND	33	5.5	ND	ND	0	
Ethylbenzene	NA	NA	0		NA	NA	0	
Fluoranthene	ND	ND	100	1200	ND	ND	0	
Fluorene	ND	ND	0		ND	ND	0	
Gamma Chlordane	ND	ND	100	49	ND	ND	0	
gamma-BHC (Lindane)	ND	ND	0		ND	ND	0	
Heptachlor	ND	ND	0		ND	ND	0	
Heptachlor epoxide	ND	ND	0		ND	ND	0	
Heptachlorobiphenyl	0.361	1.64	0		ND	ND	0	
Hexachlorobenzene	ND	ND	0		ND	ND	0	
Hexachlorobiphenyl	1.53	6.93	100	400	ND	ND	0	
Hexachlorobutadiene	ND	ND	0		ND	ND	0	
Hexachlorocyclopentadiene	ND	ND	0		ND	ND	0	
Hexachloroethane	ND	ND	0		ND	ND	0	
Indeno(1,2,3-cd)pyrene	ND	ND	0		ND	ND	0	
Iron	NA	NA,	100	25000	NA	NA	100	22000
Isophorone	ND	ND	0		ND	ND	0	
Lead	0.00218	0.0099	100	260	ND	ND	100	23
Magnesium	NA	NA	100	7500	NA	NA	100	6500
Manganese	NA	NA	100	320	NA	NA	100	770
MCPA_(4-chloro-2-methylphenox	ND	ND	0		1.06	0.724	0	
MCPP_2-(4-chloro-2-methylphenc	ND	ND	0		ND	ND	0	
Mercury	0.0426	0.193	100	0.5	0.952	0.641	100	0.063
Methoxychlor	ND	ND	0		ND	ND	0	
Methylene chloride (Dichlorometh	NA	NA	0		NA	NA	0	
Molybdenum	NA	NA	0		NA	NA	100	0.49
Monochlorobiphenyl	ND	ND	0		ND	ND	0	
Naphthalene	ND	ND	0		ND	ND	0	
Nickel	ND	ND	100	260	ND	ND	100	23
Nitrobenzene	ND	ND	0		ND	ND	0	
n-Nitrosodi-n-propylamine	ND	ND	0		ND	ND	0	
N-Nitrosodiphenylamine/Diphenyla	ND	ND	0		ND	ND	0	
Nonachlorobiphenyl	ND	ND	0		ND	ND	0	
Octachlorobiphenyl	ND	ND	0		ND	ND	0	
Pentachlorobiphenyl	1.07	4.86	100	820	ND	ND	0	
Pentachlorophenol	0.000773	0.00351	33	3.9	0.00382	0.00257	50	1.9
pH	NA	NA	100	6.84	NA	NA	100	7.31
Phenanthrene	ND	ND	33	410	ND	ND	0	
Phenol	ND	ND	0		ND	ND	0	
Potassium	NA	NA	100	3200	NA	NA	100	2300
Pyrene	ND	ND	100	1100	ND	ND	0	
Selenium	0.374	1.7	0		ND	ND	0	
Silver	ND	ND	0		ND	ND	0	
Sodium	NA	NA	0		NA	NA	0	
Styrene	NA	NA	0		NA	NA	0	
Tetrachlorobiphenyl	2.94	13.3	0		ND	ND	0	
Tetrachloroethene	NA	NA	0		NA	NA	0	
Thallium	NA	NA	0		NA	NA	0	
Toluene	NA	NA	0		NA	NA	0	
Toxaphene	ND	ND	0		ND	ND	0	
trans-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Trichlorobiphenyl	0.323	1.46	0		ND	ND	0	
Trichloroethene	NA	NA	0		NA	NA	0	
Vanadium	NA	NA	100	51	NA	NA	100	36
Vinyl chloride	NA	NA	0		NA	NA	0	
Xylenes, Total	NA	NA	0		NA	NA	0	
Zinc	0.0227	0.103	100	2700	0.192	0.129	100	95

Table A1 Calculated Bioaccumulation Factors for Forage Fish

	F.F. CS-D COMP 1				F.F. REF 1 COMP 1			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration

	F.F. REF 2 COMP 1				F.F. REF 2 COMP 2			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
1,1,1-Trichloroethane	NA	NA	0		NA	NA	0	
1,1,2,2-Tetrachloroethane	NA	NA	0		NA	NA	0	
1,1,2-Trichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethane	NA	NA	0		NA	NA	0	
1,1-Dichloroethene	NA	NA	0		NA	NA	0	
1,2,3,4,6,7,8,9-OCDD	0.00839	0.0138	100	8.57	0.00372	0.00557	100	8.57
1,2,3,4,6,7,8,9-OCDF	0.297	0.489	100	0.107	0.0231	0.0346	100	0.107
1,2,3,4,6,7,8-HpCDD	0.0351	0.0579	100	0.14	0.0172	0.0257	100	0.14
1,2,3,4,6,7,8-HpCDF	0.0936	0.154	100	0.0263	ND	ND	100	0.0263
1,2,3,4,7,8,9-HpCDF	ND	ND	0		ND	ND	0	
1,2,3,4,7,8-HxCDD	ND	ND	50	0.0021	ND	ND	50	0.0021
1,2,3,4,7,8-HxCDF	0.329	0.544	50	0.003	ND	ND	50	0.003
1,2,3,6,7,8-HxCDD	0.181	0.298	100	0.004	0.184	0.275	100	0.004
1,2,3,6,7,8-HxCDF	ND	ND	50	0.0013	ND	ND	50	0.0013
1,2,3,7,8,9-HxCDD	ND	ND	100	0.00505	ND	ND	100	0.00505
1,2,3,7,8,9-HxCDF	ND	ND	0		ND	ND	0	
1,2,3,7,8-PeCDD	0.888	1.14	100	0.00145	ND	ND	100	0.00145
1,2,3,7,8-PeCDF	ND	ND	50	0.0011	ND	ND	50	0.0011
1,2,4-Trichlorobenzene	ND	ND	0		ND	ND	0	
1,2-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,2-Dichloroethane	NA	NA	0		NA	NA	0	
1,2-Dichloropropane	NA	NA	0		NA	NA	0	
1,3-Dichlorobenzene	ND	ND	0		ND	ND	0	
1,4-Dichlorobenzene	ND	ND	0		ND	ND	0	
2,2'-Oxybis(1-chloropropane)_bis(2	ND	ND	0		ND	ND	0	
2,3,4,6,7,8-HxCDF	ND	ND	50	0.0016	ND	ND	50	0.0016
2,3,4,7,8-PeCDF	ND	ND	50	0.0013	ND	ND	50	0.0013
2,3,7,8-TCDD	3.82	6.31	0		ND	ND	0	
2,3,7,8-TCDF	1.2	1.99	100	0.0014	ND	ND	100	0.0014
2,4,5-T	ND	ND	0		ND	ND	0	
2,4,5-TP (Silvex)	ND	ND	0		ND	ND	0	
2,4,5-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4,6-Trichlorophenol	ND	ND	0		ND	ND	0	
2,4-D	ND	ND	0		ND	ND	0	
2,4-DB	ND	ND	0		ND	ND	0	
2,4-Dichlorophenol	ND	ND	0		ND	ND	0	
2,4-Dimethylphenol	ND	ND	0		ND	ND	0	
2,4-Dinitrophenol	ND	ND	0		ND	ND	0	
2,4-Dinitrotoluene	ND	ND	0		ND	ND	0	
2,6-Dinitrotoluene	ND	ND	100	14	ND	ND	100	14
2-Chloronaphthalene	ND	ND	0		ND	ND	0	
2-Chlorophenol	ND	ND	0		ND	ND	0	
2-Hexanone	NA	NA	0		NA	NA	0	
2-Methylnaphthalene	ND	ND	0		ND	ND	0	
2-Methylphenol (o-cresol)	ND	ND	0		ND	ND	0	
2-Nitroaniline	ND	ND	0		ND	ND	0	
2-Nitrophenol	ND	ND	0		ND	ND	0	
3,3'-Dichlorobenzidine	ND	ND	0		ND	ND	0	
3&4-Methylphenol (m&p-cresol)	ND	ND	0		ND	ND	0	
3-Nitroaniline	ND	ND	0		ND	ND	0	
4,4'-DDD	ND	ND	0		ND	ND	0	
4,4'-DDE	ND	ND	0		0.371	0.557	0	
4,4'-DDT	ND	ND	0		ND	ND	0	
4,6-Dinitro-2-methylphenol	ND	ND	0		ND	ND	0	
4-Bromophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Chloro-3-methylphenol	ND	ND	0		ND	ND	0	
4-Chloroaniline	ND	ND	0		ND	ND	0	
4-Chlorophenylphenyl ether	ND	ND	0		ND	ND	0	
4-Methyl-2-pentanone (MIBK)	NA	NA	0		NA	NA	0	
4-Nitroaniline	ND	ND	0		ND	ND	0	
4-Nitrophenol	ND	ND	0		ND	ND	0	
Acenaphthene	ND	ND	0		ND	ND	0	
Acenaphthylene	ND	ND	0		ND	ND	0	
Acetone	NA	NA	100	52	NA	NA	100	52
Aldrin	ND	ND	0		ND	ND	0	
Alpha Chlordane	ND	ND	0		ND	ND	0	
alpha-BHC	ND	ND	0		ND	ND	0	
Aluminum	0.00516	0.00852	100	19000	0.00645	0.00966	100	19000
Anthracene	ND	ND	0		ND	ND	0	
Antimony	ND	ND	100	4	ND	ND	100	4
Arsenic	ND	ND	100	7	ND	ND	100	7
Barium	NA	NA	100	220	NA	NA	100	220
Benzene	NA	NA	0		NA	NA	0	
Benzo(a)anthracene	ND	ND	0		ND	ND	0	
Benzo(a)pyrene	ND	ND	0		ND	ND	0	
Benzo(b)fluoranthene	ND	ND	0		ND	ND	0	
Benzo(g,h,i)perylene	ND	ND	0		ND	ND	0	
Benzo(k)fluoranthene	ND	ND	0		ND	ND	0	
Beryllium	ND	ND	100	1	ND	ND	100	1
beta-BHC	ND	ND	0		ND	ND	0	
bis(2-Chloroethoxy)methane	ND	ND	0		ND	ND	0	
bis(2-Chloroethyl)ether	ND	ND	0		ND	ND	0	
bis(2-Ethylhexyl)phthalate	1.56	2.57	0		0.55	0.825	0	
Bromodichloromethane	NA	NA	0		NA	NA	0	
Bromoform	NA	NA	0		NA	NA	0	

Compounds	F.F. REF 2 COMP 1 BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	F.F. REF 2 COMP 2 BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration
Bromomethane (Methyl bromide)	NA	NA	0		NA	NA	0	
Butylbenzylphthalate	ND	ND	0		ND	ND	0	
Cadmium	ND	ND	100	0.65	ND	ND	100	0.65
Calcium	NA	NA	100	12000	NA	NA	100	12000
Carbazole	ND	ND	0		ND	ND	0	
Carbon disulfide	NA	NA	0		NA	NA	0	
Carbon tetrachloride	NA	NA	0		NA	NA	0	
Chlorobenzene	NA	NA	0		NA	NA	0	
Chloroethane	NA	NA	0		NA	NA	0	
Chloroform	NA	NA	0		NA	NA	0	
Chloromethane	NA	NA	0		NA	NA	0	
Chromium	0.021	0.0346	100	25	0.0224	0.0336	100	25
Chrysene	ND	ND	0		ND	ND	0	
Cis/Trans-1,2-Dichloroethene	NA	NA	0		NA	NA	0	
cis-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Cobalt	NA	NA	100	10	NA	NA	100	10
Copper	0.0215	0.0355	100	23	0.0385	0.0577	100	23
Cyanide, Total	ND	ND	0		ND	ND	0	
Dalapon	ND	ND	0		ND	ND	0	
Decachlorobiphenyl	ND	ND	0		ND	ND	0	
delta-BHC	ND	ND	0		ND	ND	0	
Dibenzo(a,h)anthracene	ND	ND	0		ND	ND	0	
Dibenzofuran	ND	ND	0		ND	ND	0	
Dibromochloromethane	NA	NA	0		NA	NA	0	
Dicamba	ND	ND	0		ND	ND	0	
Dichlorobiphenyl	ND	ND	0		ND	ND	0	
Dichloroprop	ND	ND	0		ND	ND	0	
Dieldrin	ND	ND	0		0.457	0.686	0	
Diethylphthalate	0.111	0.183	0		ND	ND	0	
Dimethylphthalate	ND	ND	0		ND	ND	0	
Di-n-butylphthalate	ND	ND	0		ND	ND	0	
Di-n-octylphthalate	ND	ND	0		ND	ND	0	
Dinoseb	ND	ND	0		ND	ND	0	
Endosulfan I	ND	ND	0		ND	ND	0	
Endosulfan II	ND	ND	0		ND	ND	0	
Endosulfan sulfate	ND	ND	0		ND	ND	0	
Endrin	ND	ND	0		ND	ND	0	
Endrin aldehyde	ND	ND	0		ND	ND	0	
Endrin ketone	ND	ND	0		ND	ND	0	
Ethylbenzene	NA	NA	0		NA	NA	0	
Fluoranthene	ND	ND	0		ND	ND	0	
Fluorene	ND	ND	0		ND	ND	0	
Gamma Chlordane	ND	ND	0		0.667	1	0	
gamma-BHC (Lindane)	ND	ND	0		ND	ND	0	
Heptachlor	ND	ND	0		ND	ND	0	
Heptachlor epoxide	ND	ND	0		ND	ND	0	
Heptachlorobiphenyl	ND	ND	0		ND	ND	0	
Hexachlorobenzene	ND	ND	0		ND	ND	0	
Hexachlorobiphenyl	ND	ND	0		ND	ND	0	
Hexachlorobutadiene	ND	ND	0		ND	ND	0	
Hexachlorocyclopentadiene	ND	ND	0		ND	ND	0	
Hexachloroethane	ND	ND	0		ND	ND	0	
Indeno(1,2,3-cd)pyrene	ND	ND	0		ND	ND	0	
Iron	NA	NA	100	24000	NA	NA	100	24000
Isophorone	ND	ND	0		ND	ND	0	
Lead	ND	ND	100	26	0.0174	0.0261	100	26
Magnesium	NA	NA	100	5800	NA	NA	100	5800
Manganese	NA	NA	100	770	NA	NA	100	770
MCPA_(4-chloro-2-methylphenoxy	ND	ND	0		ND	ND	0	
MCPP_2-(4-chloro-2-methylpheno	ND	ND	0		ND	ND	0	
Mercury	1.17	1.93	100	0.047	1.47	2.21	100	0.047
Methoxychlor	ND	ND	0		ND	ND	0	
Methylene chloride (Dichorometh	NA	NA	0		NA	NA	0	
Molybdenum	NA	NA	100	0.53	NA	NA	100	0.53
Monochlorobiphenyl	ND	ND	0		ND	ND	0	
Naphthalene	ND	ND	0		ND	ND	0	
Nickel	ND	ND	100	26	ND	ND	100	26
Nitrobenzene	ND	ND	0		ND	ND	0	
n-Nitrosodi-n-propylamine	ND	ND	0		ND	ND	0	
N-Nitrosodiphenylamine/Diphenyla	ND	ND	0		ND	ND	0	
Nonachlorobiphenyl	ND	ND	0		ND	ND	0	
Octachlorobiphenyl	ND	ND	0		ND	ND	0	
Pentachlorobiphenyl	ND	ND	0		ND	ND	0	
Pentachlorophenol	ND	ND	0		0.00327	0.0049	0	
pH	NA	NA	100	7.24	NA	NA	100	7.24
Phenanthrene	ND	ND	0		ND	ND	0	
Phenol	ND	ND	0		ND	ND	0	
Potassium	NA	NA	100	2600	NA	NA	100	2600
Pyrene	ND	ND	0		ND	ND	0	
Selenium	0.574	0.948	0		0.667	1	0	
Silver	ND	ND	0		ND	ND	0	
Sodium	NA	NA	0		NA	NA	0	
Styrene	NA	NA	0		NA	NA	0	
Tetrachlorobiphenyl	ND	ND	0		ND	ND	0	
Tetrachloroethene	NA	NA	0		NA	NA	0	
Thallium	NA	NA	0		NA	NA	0	
Toluene	NA	NA	0		NA	NA	0	
Toxaphene	ND	ND	0		ND	ND	0	
trans-1,3-Dichloropropene	NA	NA	0		NA	NA	0	
Trichlorobiphenyl	ND	ND	0		ND	ND	0	
Trichloroethene	NA	NA	0		NA	NA	0	
Vanadium	NA	NA	100	44	NA	NA	100	44
Vinyl chloride	NA	NA	0		NA	NA	0	
Xylenes, Total	NA	NA	0		NA	NA	0	
Zinc	0.426	0.703	100	96	0.348	0.523	100	96

	F.F. REF 2 COMP 1				F.F. REF 2 COMP 2			
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration

	F.F. REF 2 COMP 3				BAF		BSAFn	
Compounds	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	Average	Maximum	Average	Maximum
1,1,1-Trichloroethane	NA	NA	0		NA	NA	NA	NA
1,1,2,2-Tetrachloroethane	NA	NA	0		NA	NA	NA	NA
1,1,2-Trichloroethane	NA	NA	0		NA	NA	NA	NA
1,1-Dichloroethane	NA	NA	0		NA	NA	NA	NA
1,1-Dichloroethene	NA	NA	0		NA	NA	NA	NA
1,2,3,4,6,7,8,9-OCDD	0.0108	0.0105	100	8.57	0.00	0.0108	0.01	0.0138
1,2,3,4,6,7,8,9-OCDF	ND	ND	100	0.107	0.05	0.297	0.08	0.489
1,2,3,4,6,7,8-HpCDD	0.0313	0.0304	100	0.14	0.01	0.0351	0.02	0.0679
1,2,3,4,6,7,8-HpCDF	ND	ND	100	0.0283	0.03	0.0836	0.05	0.154
1,2,3,4,7,8,9-HpCDF	*ND*	*ND*	*0*		*0.02*	*0.0624*	*0.07*	*0.201*
1,2,3,4,7,8-HxCDD	ND	ND	80	0.0021	0.01	0.012	0.04	0.0545
1,2,3,4,7,8-HxCDF	0.133	0.128	80	0.003	0.12	0.329	0.20	0.544
1,2,3,6,7,8-HxCDD	0.121	0.117	100	0.004	0.10	0.184	0.15	0.298
1,2,3,6,7,8-HxCDF	ND	ND	80	0.0013	0.00	0.0066	0.02	0.0309
1,2,3,7,8,9-HxCDD	ND	ND	100	0.00505	0.00	0.00529	0.02	0.024
1,2,3,7,8,9-HxCDF	ND	ND	0		ND	ND	ND	ND
1,2,3,7,8-PeCDD	ND	ND	100	0.00145	0.25	0.686	0.48	1.14
1,2,3,7,8-PeCDF	ND	ND	80	0.0011	0.01	0.00922	0.07	0.0676
1,2,4-Trichlorobenzene	ND	ND	0		ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	0		ND	ND	ND	ND
1,2-Dichloroethane	NA	NA	0		NA	NA	NA	NA
1,2-Dichloropropane	NA	NA	0		NA	NA	NA	NA
1,3-Dichlorobenzene	ND	ND	0		ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	0		ND	ND	ND	ND
2,2'-Oxybis(1-chloropropane)_bis(2	ND	ND	0		ND	ND	ND	ND
2,3,4,6,7,8-HxCDF	ND	ND	80	0.0016	0.00	0.00686	0.02	0.0312
2,3,4,7,8-PeCDF	*ND*	*ND*	*80*	*0.0013*	*0.06*	*0.125*	*0.23*	*0.403*
2,3,7,8-TCDD	2.13	2.07	0		1.10	3.82	1.77	6.31
2,3,7,8-TCDF	0.88	0.854	100	0.0014	0.86	2.22	1.69	2.93
2,4,5-T	ND	ND	0		ND	ND	ND	ND
2,4,5-TP (Silvex)	ND	ND	0		ND	ND	ND	ND
2,4,5-Trichlorophenol	ND	ND	0		ND	ND	ND	ND
2,4,6-Trichlorophenol	ND	ND	0		ND	ND	ND	ND
2,4-D	ND	ND	0		ND	ND	ND	ND
2,4-DB	ND	ND	0		0.83	1.08	1.86	2.75
2,4-Dichlorophenol	ND	ND	0		ND	ND	ND	ND
2,4-Dimethylphenol	ND	ND	0		ND	ND	ND	ND
2,4-Dinitrophenol	ND	ND	0		ND	ND	ND	ND
2,4-Dinitrotoluene	ND	ND	0		ND	ND	ND	ND
2,6-Dinitrotoluene	ND	ND	100	14	ND	ND	ND	ND
2-Chloronaphthalene	ND	ND	0		ND	ND	ND	ND
2-Chlorophenol	ND	ND	0		ND	ND	ND	ND
2-Hexanone	NA	NA	0		NA	NA	NA	NA
2-Methylnaphthalene	*ND*	*ND*	*0*		*ND*	*ND*	*ND*	*ND*
2-Methylphenol (o-cresol)	ND	ND	0		ND	ND	ND	ND
2-Nitroaniline	ND	ND	0		ND	ND	ND	ND
2-Nitrophenol	ND	ND	0		ND	ND	ND	ND
3,3'-Dichlorobenzidine	ND	ND	0		ND	ND	ND	ND
3&4-Methylphenol (m&p-cresol)	ND	ND	0		ND	ND	ND	ND
3-Nitroaniline	ND	ND	0		ND	ND	ND	ND
4,4'-DDD	NA	NA	0		NA	NA	NA	NA
4,4'-DDE	NA	NA	0		2.62	5.06	7.12	15.3
4,4'-DDT	NA	NA	0		ND	ND	ND	ND
4,6-Dinitro-2-methylphenol	ND	ND	0		ND	ND	ND	ND
4-Bromophenylphenyl ether	ND	ND	0		ND	ND	ND	ND
4-Chloro-3-methylphenol	ND	ND	0		ND	ND	ND	ND
4-Chloroaniline	ND	ND	0		ND	ND	ND	ND
4-Chlorophenylphenyl ether	ND	ND	0		ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	NA	NA	0		NA	NA	NA	NA
4-Nitroaniline	ND	ND	0		ND	ND	ND	ND
4-Nitrophenol	ND	ND	0		ND	ND	ND	ND
Acenaphthene	ND	ND	0		ND	ND	ND	ND
Acenaphthylene	ND	ND	0		ND	ND	ND	ND
Acetone	NA	NA	100	52	ND	ND	ND	ND
Aldrin	NA	NA	0		ND	ND	ND	ND
Alpha Chlordane	NA	NA	0		ND	ND	ND	ND
alpha-BHC	*NA*	*NA*	*0*		*ND*	*ND*	*ND*	*ND*
Aluminum	0.000535	0.00082	100	19000	0.003	0.00645	0.01	0.0102
Anthracene	ND	ND	0		ND	ND	ND	ND
Antimony	ND	ND	100	4	ND	ND	ND	ND
Arsenic	ND	ND	100	7	ND	ND	ND	ND
Barium	NA	NA	100	220	ND	ND	ND	ND
Benzene	NA	NA	0		NA	NA	NA	NA
Benzo(a)anthracene	ND	ND	0		ND	ND	ND	ND
Benzo(a)pyrene	ND	ND	0		ND	ND	ND	ND
Benzo(b)fluoranthene	ND	ND	0		ND	ND	ND	ND
Benzo(g,h,i)perylene	ND	ND	0		ND	ND	ND	ND
Benzo(k)fluoranthene	ND	ND	0		ND	ND	ND	ND
Beryllium	ND	ND	100	1	ND	ND	ND	ND
beta-BHC	NA	NA	0		ND	ND	ND	ND
bis(2-Chloroethoxy)methane	ND	ND	0		ND	ND	ND	ND
bis(2-Chloroethyl)ether	ND	ND	0		ND	ND	ND	ND
bis(2-Ethylhexyl)phthalate	0.778	0.758	0		0.78	1.56	1.38	2.57
Bromodichloromethane	*NA*	*NA*	*0*		*NA*	*NA*	*NA*	*NA*
Bromoform	NA	NA	0		NA	NA	NA	NA

Compounds	F.F. REF 2 COMP 3 BAF	F.F. REF 2 COMP 3 BSAFn	F.F. REF 2 COMP 3 Detection Frequency in Sediment	F.F. REF 2 COMP 3 Maximum Sediment Concentration	BAF Average	BAF Maximum	BSAFn Average	BSAFn Maximum
Bromomethane (Methyl bromide)	NA	NA	0		NA	NA	NA	NA
Butylbenzylphthalate	ND	ND	0		ND	ND	ND	ND
Cadmium	ND	ND	100	0.65	ND	ND	ND	ND
Calcium	NA	NA	100	12000	ND	ND	ND	ND
Carbazole	NA	NA	0		ND	ND	ND	ND
Carbon disulfide	NA	NA	0		NA	NA	NA	NA
Carbon tetrachloride	NA	NA	0		NA	NA	NA	NA
Chlorobenzene	NA	NA	0		NA	NA	NA	NA
Chloroethane	NA	NA	0		NA	NA	NA	NA
Chloroform	NA	NA	0		NA	NA	NA	NA
Chloromethane	NA	NA	0		NA	NA	NA	NA
Chromium	0.081	0.0786	100	25	0.0211	0.081	0.04	0.0786
Chrysene	ND	ND	0		ND	ND	ND	ND
Cis/Trans-1,2-Dichloroethene	NA	NA	0		NA	NA	NA	NA
cis-1,3-Dichloropropene	NA	NA	0		NA	NA	NA	NA
Cobalt	NA	NA	100	10	ND	ND	ND	ND
Copper	0.0277	0.0269	100	23	0.02	0.0386	0.04	0.108
Cyanide, Total	ND	ND	0		ND	ND	ND	ND
Dalapon	ND	ND	0		ND	ND	ND	ND
Decachlorobiphenyl	ND	ND	0		ND	ND	ND	ND
delta-BHC	NA	NA	0		ND	ND	ND	ND
Dibenzo(a,h)anthracene	ND	ND	0		0.20	0.378	0.552	1.01
Dibenzofuran	ND	ND	0		ND	ND	ND	ND
Dibromochloromethane	NA	NA	0		NA	NA	NA	NA
Dicamba	ND	ND	0		0.09	0.0922	0.30	0.297
Dichlorobiphenyl	ND	ND	0		ND	ND	ND	ND
Dichloroprop	ND	ND	0		0.0465	0.0479	0.09	0.154
Dieldrin	NA	NA	0		0.87	1.29	0.777	0.867
Diethylphthalate	0.206	0.2	0		0.11	0.206	0.27	0.506
Dimethylphthalate	ND	ND	0		ND	ND	ND	ND
Di-n-butylphthalate	ND	ND	0		ND	ND	ND	ND
Di-n-octylphthalate	ND	ND	0		ND	ND	ND	ND
Dinoseb	ND	ND	0		ND	ND	ND	ND
Endosulfan I	NA	NA	0		ND	ND	ND	ND
Endosulfan II	NA	NA	0		ND	ND	ND	ND
Endosulfan sulfate	NA	NA	0		ND	ND	ND	ND
Endrin	NA	NA	0		ND	ND	ND	ND
Endrin aldehyde	NA	NA	0		ND	ND	ND	ND
Endrin ketone	NA	NA	0		ND	ND	ND	ND
Ethylbenzene	NA	NA	0		NA	NA	NA	NA
Fluoranthene	ND	ND	0		ND	ND	ND	ND
Fluorene	ND	ND	0		ND	ND	ND	ND
Gamma Chlordane	NA	NA	0		0.67	0.667	1.00	1
gamma-BHC (Lindane)	NA	NA	0		ND	ND	ND	ND
Heptachlor	NA	NA	0		ND	ND	ND	ND
Heptachlor epoxide	NA	NA	0		ND	ND	ND	ND
Heptachlorobiphenyl	ND	ND	0		0.27	0.361	1.49	1.64
Hexachlorobenzene	ND	ND	0		ND	ND	ND	ND
Hexachlorobiphenyl	ND	ND	0		1.47	2.28	5.05	7.33
Hexachlorobutadiene	ND	ND	0		ND	ND	ND	ND
Hexachlorocyclopentadiene	ND	ND	0		ND	ND	ND	ND
Hexachloroethane	ND	ND	0		ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	ND	ND	0		0.23	0.225	0.604	0.604
Iron	NA	NA	100	24000	NA	NA	NA	NA
Isophorone	ND	ND	0		ND	ND	ND	ND
Lead	ND	ND	100	26	0.008	0.0174	0.02	0.0373
Magnesium	NA	NA	100	5800	NA	NA	NA	NA
Manganese	NA	NA	100	770	NA	NA	NA	NA
MCPA_(4-chloro-2-methylphenoxy	ND	ND	0		1.12	1.17	2.47	3.54
MCPP_2-(4-chloro-2-methylphenc	ND	ND	0		ND	ND	ND	ND
Mercury	1.06	1.03	100	0.047	1.42	4.84	2.91	13
Methoxychlor	NA	NA	0		NA	NA	NA	NA
Methylene chloride (Dichlorometh	NA	NA	0		NA	NA	NA	NA
Molybdenum	NA	NA	100	0.53	NA	NA	NA	NA
Monochlorobiphenyl	ND	ND	0		ND	ND	ND	ND
Naphthalene	ND	ND	0		ND	ND	ND	ND
Nickel	ND	ND	100	26	ND	ND	ND	ND
Nitrobenzene	ND	ND	0		ND	ND	ND	ND
n-Nitrosodi-n-propylamine	ND	ND	0		ND	ND	ND	ND
N-Nitrosodiphenylamine/Diphenyla	ND	ND	0		ND	ND	ND	ND
Nonachlorobiphenyl	ND	ND	0		ND	ND	ND	ND
Octachlorobiphenyl	ND	ND	0		0.11	0.111	0.82	0.815
Pentachlorobiphenyl	ND	ND	0		0.66	1.07	2.73	4.86
Pentachlorophenol	ND	ND	0		0.00236	0.00382	0.00461	0.00677
pH	NA	NA	100	7.24	NA	NA	NA	NA
Phenanthrene	ND	ND	0		ND	ND	ND	ND
Phenol	ND	ND	0		ND	ND	ND	ND
Potassium	NA	NA	100	2600	NA	NA	NA	NA
Pyrene	ND	ND	0		ND	ND	ND	ND
Selenium	ND	ND	0		0.479	0.667	1.22	1.7
Silver	ND	ND	0		ND	ND	ND	ND
Sodium	NA	NA	0		NA	NA	NA	NA
Styrene	NA	NA	0		NA	NA	NA	NA
Tetrachlorobiphenyl	ND	ND	0		1.50	2.94	6.85	13.3
Tetrachloroethene	NA	NA	0		NA	NA	NA	NA
Thallium	NA	NA	0		NA	NA	NA	NA
Toluene	NA	NA	0		NA	NA	NA	NA
Toxaphene	NA	NA	0		NA	NA	NA	NA
trans-1,3-Dichloropropene	NA	NA	0		NA	NA	NA	NA
Trichlorobiphenyl	ND	ND	0		0.18	0.323	0.84	1.48
Trichloroethene	NA	NA	0		NA	NA	NA	NA
Vanadium	NA	NA	100	44	NA	NA	NA	NA
Vinyl chloride	NA	NA	0		NA	NA	NA	NA
Xylenes, Total	NA	NA	0		NA	NA	NA	NA
Zinc	0.323	0.313	100	96	0.18	0.426	0.30	0.703

BAF = Bioaccumulation Factor

BSAFn = Biota-Sediment Accumulation Factor (lipid and organic carbon normalized)

BAF and BSAFn are not calculated if compound was not detected or analyzed in forage fish

BAF and BSAFn calculated assuming 1/2 detection limit for nondetects in sediment. If all samples

Compounds	F.F. REF 2 COMP 3				BAF		BSAFn	
	BAF	BSAFn	Detection Frequency in Sediment	Maximum Sediment Concentration	Average	Maximum	Average	Maximum

non-detect in sediment, BAF and BSAFn solely based on detection limits.
Units: organics=ug/kg, inorganics=mg/kg
Originally presented in Appendix D of June 2002 Ecological Risk Assessment.

Table A2 Site-Specific, Risk-Based Concentrations for Protection of Fish

Compound	Whole Body Toxicity Values for Fish (mg/kg)	Endpoint	Calculated Average BAF, BSAFs or sediment-fish relationship[2]	Predicted Risk Based Sediment Concentration (mg/kg)[3]
Cyanide	NA			
Pesticides/Herbicides				
2,4,5-T	3.7	NOED		
2,4,5-TP (Silvex)	NA			
2,4-D	1	NOED		
2,4-DB	NA		0.83	
4,4'-DDD	0.6	LOED		
4,4'-DDE	29.2	NOED	7.12	4.1
4,4'-DDT	3.8	LOED		
Total DDT				4.1
Aldrin	*0.157*	*NOED*		
alpha-BHC	NA			
alpha-Chlordane	16.6	LOED		
beta-BHC	NA			
Dalapon	NA			
delta-BHC	NA			
Dicamba	NA		0.0922	
Dichlorprop	NA		0.0465	
Dieldrin	3.7	LOED	0.777	4.76
Endosulfan I	0.195	NOED		
Endosulfan II	0.195	NOED		
Endosulfan sulfate	NA			
Endrin ketone	NA			
gamma-BHC (Lindane)	2.3	NOED		
gamma-Chlordane	16.6	LOED	1	16.6
Heptachlor	6.7	NOED		
Heptachlor epoxide	3.2	NOED		
MCPP	NA			
Methoxychlor	0.128	NOED		
Semivolatile Organic Compounds				
1,2,4-Trichlorobenzene	NA			
1,2-Dichlorobenzene	0.7	NOED		
1,3-Dichlorobenzene	170	NOED/LOED		
1,4-Dichlorobenzene	69.5	NOED		
2,4,5-Trichlorophenol	NA			
2,4,6-Trichlorophenol	9.9			
2,4-Dichlorophenol	NA			
2-Chlorophenol	1.96			
2-Methylnaphthalene	NA			
3&4Methylphenol	NA			
4-Chloroaniline	119	LOED		
4-Nitroaniline	NA			
4-Nitrophenol	NA			
Acenaphthene	3.5			PAHs are metabolized in fish.
Acenaphthylene	NA			
Anthracene	NA			
Benzo(a)anthracene	NA			
Benzo(a)pyrene	*0.0239*	*NOED*		
Benzo(b)fluoranthene	NA			
Benzo(g,h,i)perylene	NA			
Benzo(k)fluoranthene	NA			
Bis(2-ethylhexyl)phthalate	0.66	NOED	1.38	0.478
Butylbenzylphthalate	6.45	NOED		
Carbazole	NA			
Chrysene	NA			
Dibenzo(a,h)anthracene	NA		0.552	
Dibenzofuran	NA			
di-n-Butylphthalate	NA			

Table A2 Site-Specific, Risk-Based Concentrations for Protection of Fish

Compound	Whole Body Toxicity Values for Fish (mg/kg)	Endpoint	Calculated Average BAF, BSAFs or sediment-fish relationship[2]	Predicted Risk Based Sediment Concentration (mg/kg)[3]
Fluoranthene	NA			
Fluorene	NA			
Hexachlorobutadiene	34.8	LOED		
Indeno(1,2,3-cd)pyrene	NA		0.604	
Naphthalene	17	LOED		
Nitrobenzene	29	LOED		
N-nitrosodiphenylamine	2	NOED		
Pentachlorophenol	NA		0.00236	
Phenanthrene	NA			
Phenol	73.4			
Pyrene	NA			
Total PAHs				
Volatile Organic Compounds				VOCs are not expected to bioaccumulate in fish.
1,1,1-Trichloroethane	0.66	NOED		
1,1,2,2-Tetrachloroethane	0.077	NOED		
1,1,2-Trichloroethane	NA			
1,2-Dichloroethane				
1,2-Dichloroethene (total)				
2-Butanone (MEK)				
2-Hexanone				
4-Methyl-2-pentanone (MIBK)				
Acetone	NA			
Benzene	NA			
Bromodichloromethane				
Bromoform				
Carbon disulfide				
Chlorobenzene	1.4	NOED		
Chloroform	0.66	NOED		
Dibromochloromethane				
Ethylbenzene				
Methylene chloride				
Styrene				
Tetrachloroethene	0.17	NOED		
Toluene				
Trichloroethene				
Vinyl chloride				
Xylenes (total)				
Inorganics				
Aluminum	12.5	NOED	$\ln[Al_{fish}] = -21.2593 + 2.583 \ln[Al_{sed}]$	9960
Antimony				
Arsenic	0.52	LOED		
Barium	NA			
Beryllium	5.3	NOED		
Cadmium	0.5	LOED		
Chromium	5.5	NOED	0.0211	261
Cobalt	NA			
Copper	12.1	NOED/LOED	$\ln(Cu)_{fish} = -1.9295+0.4371 \ln(Cu)_{sed}$	24792
Iron				
Lead	26.2	NOED/LOED	0.00833	3150
Manganese				
Mercury	0.25	NOED/LOED	1.42	0.18
Molybdenum				
Nickel	NA			
Selenium			0.479	
Silver				
Thallium	2.72	NOED		
Tin				

Table A2 Site-Specific, Risk-Based Concentrations for Protection of Fish

Compound	Whole Body Toxicity Values for Fish (mg/kg)	Endpoint	Calculated Average BAF, BSAFs or sediment-fish relationship[2]	Predicted Risk Based Sediment Concentration (mg/kg)[3]
Vanadium	0.68	NOED		
Zinc	50	NOED/LOED	$\ln[Zn]_{fish} = 2.4275 + 0.1754 \ln[Zn]_{sed}$	4739
PCBs				
Monochlorobiphenyl				
Dichlorobiphenyl				
Trichlorobiphenyl			0.84	
Tetrachlorobiphenyl			6.85	
Pentachlorobiphenyl			2.73	
Hexachlorobiphenyl			5.05	
Heptachlorobiphenyl			1.49	
Octachlorobiphenyl			0.815	
Nonachlorobiphenyl				
Decachlorobiphenyl				
Total PCBs	0.95	NOED	$\ln[PCB_{fish}/\%lipids] = 1.6666 + 0.6806 \ln[PCB_{sed}/\%OC]$	0.58
Dioxins				
1,2,3,4,6,7,8,9-OCDD			0.00636	
1,2,3,4,6,7,8-HpCDD			0.019	
1,2,3,4,7,8-HxCDD			0.0391	
1,2,3,6,7,8-HxCDD			0.147	
1,2,3,7,8,9-HxCDD			0.019	
1,2,3,7,8-PeCDD			0.484	
Furans				
1,2,3,4,6,7,8,9-OCDF			0.0822	
1,2,3,4,6,7,8-HpCDF			0.049	
1,2,3,4,7,8,9-HpCDF			0.0731	
1,2,3,4,7,8-HxCDF			0.2	
1,2,3,6,7,8-HxCDF			0.0841	
1,2,3,7,8,9-HxCDF				
1,2,3,7,8-PeCDF			0.0676	
2,3,4,6,7,8-HxCDF			0.0242	
2,3,4,7,8-PeCDF			0.231	
2,3,7,8-TCDF			1.69	
Total TEQ	0.00005	NOED	$\ln[\text{Total } TEQ_{fish}/\%lipids] = -1.748 + 0.7556 \ln[\text{Total } TEQ_{sed}/\%OC]$*	0.00051

ND = not detected

[1]Originally presented as Table 4-2 of June 2002 Ecological Risk Assessment

[2]The average Biota-Sediment Accumulation Factors calculated from forage fish and sediment collected in 1999 and 2000 or the linear regression equation derived from those data where the results are linear.

Hierarchy of use: linear regresion if statistically significant; then average BAF for non-polar compounds and inorganics; average BSAFs for polar organic compounds.

BAF (inorganics and polar organics) = [forage fish] / [sediment]

BSAF (nonpolar organics) = ([forage fish]/fraction lipid) / ([sediment]/fraction organic carbon)

*equation for dioxin TEQs is for concentration in ug/kg in both sediment and fish.

[3]If toxicity information and BSAF are available, the predicted sediment concentration is the toxicity information divided by the BAF or by the BSAF and unnormalized or predicted by the linear regression

(average fraction lipid = 0.015 and average fraction organic carbon = 0.016).

Table A3 Comparison of 95% UCL or Maximum Creek Bottom Soil Concentrations to Site-Specific, Risk-Based Concentrations for Protection of Fish

Compound	Site-Specific Risk-Based *Concentration* [1] For the Protection of Fish, mg/kg	*Illinois Soil Background, mg/kg* [2]		*Upper 95% UCL Creek Section B, mg/kg*	*Maximum Concentration* Creek Section C, mg/kg	*Maximum Concentration* Creek Section D, mg/kg[3]	*Upper 95% UCL* Creek Section E, mg/kg	*Upper 95% UCL* Creek Section F, mg/kg
		Maximum	Mean					
DDT	4.1	NA	NA	0.043	ND	0.24	0.0193	0.00695
Dieldrin	4.8	NA	NA	0.00755	0.011	0.69	0.0226	0.00379
Gamma-chlordane	17	NA	NA	0.00044	0.0011	0.067	0.00245	0.00199
Bis(2-ethylhexyl)phthalate	0.48	NA	NA	0.279	ND	ND	0.077	0.11
Chromium	261	151	21.2	71	110	57	74.2	16.9
Copper	24792	156	28.9	898	250	1600	1080	230
Lead	3150	647	71.1	99.5	140	280	126	88.1
Mercury	0.18	0.99	0.12	**0.19**	**0.31**	**0.238**	**0.71**	**0.419**
Zinc	4739	798	137.9	**5340**	3400	**8200**	3150	**5650**
Total PCBs	0.58	NA	NA	**1.48**	0.178	**2.437**	0.274	0.0838
Dioxin TEQs	0.0005	NA	NA	0.000279	0.0000431	**0.000866**	0.0000728	0.000156

Bold value exceeds cleanup goal

NA = not available/applicable

[1] Based on Average BAF, BSAF, or linear regression from Table 2.

[2] *Illinois Environmental Protection Agency. 1994. A Summary of Selected Background Conditions for Inorganics in Soil. IEPA/ENV/94-161*

Table A4 Creek Segment Sampling Transects with Concentrations Greater Than Risk-Based Concentrations for Protection of Fish

Compound	Site-Specific Risk-Based Concentration [1] For the Protection of Fish, mg/kg	Transects that Exceed RBCs				
		Creek Section B	Creek Section C	Creek Section D	Creek Section E	Creek Section F
Mercury	0.18	CBS-CSB-T0-C1, CBS-CSB-T1-W1, CBS-CSB-T2-E1, CBS-CSB-T2-C1, CBS-CSB-T3-E1, CBS-CSB-T6-C1, CBS-CSB-T9-W1, CBS-T11-C1, CBS-CSB-T12-C1, CBS-CSB-T17-E1	CBS-CSC-T6-1	CBS-CSD-T4-1, CBS-CSD-T6-1	CBS-CSE-T1-1, CBS-CSE-T2-1, CBS-CSE-T6-1, CBS-CSE-T8-1, CBS-CSE-T9-1, CBS-CSE-T10-1, CBS-CSE-T11-1, CBS-CSE-T12-1, CBS-CSE-T13-2, CBS-CSE-T14-1, CBS-CSE-T15-1, CBS-CSE-T16-1, CBS-CSE-T-17-1	CBS-CSF-T3-1, CBS-CSF-T5-1, CBS-CSF-T9-1, CBS-CSF-T14-1
Zinc	4739	CBS-CSB-T0-C1, CBS-CSB-T4-C1, CBS-CSB-T8-C1, CBS-CSB-T11-C1, CBS-CSB-T12-C1	Does not present a risk	CSD-T1-1 and CSD-T2-1	Does not present a risk	CBS-CSF-T-5
Total PCBs	0.58	CBS-CSB-T0-C1, CBS-CSB-T1-E1, CBS-CSB-T1-W1, CBS-CSB-T3-E1, CBS-CSB-T3-C1, CBS-CSB-T5-E1, CBS-CSB-T6-E1, CBS-CSB-T11-C1, CBS-CSB-T17-E1	Does not present a risk	CSD-T6-1	Does not present a risk	Does not present a risk
Dioxin TEQs	0.0005	Does not present a risk	Does not present a risk	CSD-T6-1	Does not present a risk	Does not present a risk

[1]Based on Average BAF, BSAF or linear regression from Table 2.
Note that risk is identified when UCL (or maximum for CS-C and CS-D) exceed RBC. This table identifies all transects over the RBC, for creek segments identified with risk.
[2]RBC = Risk Based Concentration

Table A5 Creek Segment Sampling Transects with Potential Toxicity to Benthic Organisms due to PAHs

Transects with Sum of Toxic Units Greater Than 1.0									
Creek Segment B	Sum of Toxic Units	Creek Segment C	Sum of Toxic Units	Creek Segment D	Sum of Toxic Units	Creek Segment E	Sum of Toxic Units	Creek Segment F	Sum of Toxic Units
CSB-T0-C1	11	None		None		None		CSF-T15-1[2]	1.3
CSB-T3-E1	5.4								
CSB-T12-C1	6.3								
CSB-T16-1	2.7								

[1]USEPA Draft Equilibrium-Partitioning Sediment Guidelines for PAH Mixtures (USEPA,2000) identifies sediment concentrations as potentially toxic to benthic invertebrates when the Sum of Toxic Units is greater than 1.0.
Method was presented in November 2002 Response to Comments document; results were presented as Tables 4-1 through 4-5.
[2]This transect is unlikely to be toxic since the Sum of Toxic Units is barely over 1 and multiple conservative assumptions are built into the assessment.

A[illegible]

CREEK BOTTOM SOIL LEA[illegible]ROUNDWATER SUMMARY

Table B1 Summary of Potential TACO Tier 2 Creek Bottom Soil Leaching to Groundwater Exceedances

Creek Segment	Transect	Constituent
CS-B	T0	Cadmium, Chlorobenzene
	T1	Cadmium, Dieldrin, Pentachlorophenol
	T2	Cadmium
	T3	Cadmium, Dieldrin, Pentachlorophenol, Nitrobenzene
	T4	Pentachlorophenol
	T5	Chlorobenzene, Pentachlorophenol
	T6	Cadmium, Pentachlorophenol
	T7	beta-BHC, Cadmium
	T8	beta-BHC, Cadmium, Pentachlorophenol,
	T9	beta-BHC, Cadmium, delta-BHC
	T10	Cadmium
	T11	Cadmium
	T12	Cadmium
	T16	Dieldrin
	T17	Cadmium, Dieldrin, Pentachlorophenol
	T18	Cadmium, Chlorobenzene
CS-C	T1	Cadmium
	T2	Cadmium
	T3	Cadmium
	T4	Cadmium
	T6	Cadmium
	T7	Cadmium
	T8	Cadmium
	T9	Cadmium
CS-D	T1	Cadmium
	T2	Cadmium
	T3	Cadmium
	T4	Cadmium
	T5	Cadmium
	T6	Cadmium, Dieldrin
CS-E	T1	Cadmium
	T2	Cadmium
	T3	Cadmium
	T4	Cadmium
	T5	Cadmium
	T6	Cadmium
	T7	Cadmium
	T9	Cadmium
	T12	Cadmium
	T16	Cadmium, Dieldrin
	T17	Cadmium
CS-F	T3	beta-BHC
	T5	Cadmium
	T6	Cadmium
	T7	Cadmium
	T8	Cadmium
	T9	Cadmium
	T10	Cadmium
	T11	Cadmium
	T12	Cadmium
	T14	Cadmium
	T15	Cadmium
	T16	1,1,2,2-Tetrachloroethane
Site M		1,4-Dichlorobenzene, Antimony, Nickel, Pentachlorophenol

APPENDIX B1

REVISED EVALUATION OF POTENTIAL LEACHING FROM CREEK BOTTOM SOILS

ENSR INTERNATIONAL

Memorandum

To:	Bruce Yare, Solutia	**Date:**	22 May 2003
From:	Elizabeth Perry, Maya Desai	**File:**	06105-016
RE:	Revised Evaluation of Potential Leaching from Creek Bottom Soils, Sauget Area 1	**CC:**	Lisa Bradley, ENSR

The attached files provide the revised leaching calculations, based on the USEPA comments dated January 29, 2003. Based on our meeting with the agencies on April 28, we understand Solutia will be providing a workplan to the agencies, and not a comment-specific response document. The attached tables are for your use in the workplan.

The potential leaching of constituents from the creek bottom soils to groundwater was addressed in Appendix G to Solutia's submittal dated November 1, 2002. The USEPA comments concerning the calculations are numbers 18, 19, 22, 23, and 24. If we accept all the USEPA's recommendations, the revised Tier 2 remediation objectives (ROs) are presented on the attached tables. These represent changes to the original Appendix G tables as follows:

Table G-1, screening of maximum and EPC concentrations against Tier 1 ROs for the soil-to-groundwater pathway, is unchanged.

Table G-2, a listing of COIs based on the Tier 1 screening, is unchanged.

Table G-3 has been revised, see Table 1 attached. The revision consists of revised Tier 2 ROs, including expanding the constituent list to include all constituents whose EPC (95% UCL) exceeds the Tier 1 RO.

Table G-4, TOC and f_{oc} data, is unchanged.

Tables G-5 and G-6, related to the evaluation of groundwater data, remain unchanged.

We have also provided **Table 2**, a new table which lists the constituents that exceed the Tier 2 ROs for each creek segment.

Attachment A is the revised Attachment A from Appendix G, which provides the detailed Tier 2 calculations for each constituent in each reach. The revisions are based on the USEPA's recommendations.

Constituent	Units	Exposure Point Concentration (EPC)	TACO Tier 1 Class I Soil-to-groundwater (SGW) RO	Is EPC>Tier 1 SGW?	TACO Tier 2 Class I Soil-to-groundwater (SGW) RO (a)	Is EPC>Tier 2 SGW?
CS-B						
1,2,4-Trichlorobenzene	mg/kg	4.90E-01	5.00E+00	No		
1,2-Dichlorobenzene	mg/kg	4.80E-01	1.70E+01	No		
1,4-Dichlorobenzene	mg/kg	2.70E-01	2.00E+00	No		
2,4,6-Trichlorophenol	mg/kg	1.15E-01	1.50E-01	No		
2,4-Dichlorophenol	mg/kg	2.07E-01	1.00E+00	No		
4-Chloroaniline	mg/kg	5.14E-01	7.00E-01	No		
alpha-BHC	mg/kg	7.00E-04	5.00E-04	**Yes**	4.23E-03	No
Arsenic	mg/kg	1.14E+01	2.90E+01	No		
Benzene	mg/kg	6.80E-03	3.00E-02	No		
beta-BHC	mg/kg	1.50E-03	5.00E-04	**Yes**	4.23E-03	No
Cadmium	mg/kg	2.60E+01	7.50E+00	**Yes**	8.22E+00	**Yes**
Carbazole	mg/kg	1.33E-01	6.00E-01	No		
Chlorobenzene	mg/kg	1.39E+00	1.00E+00	**Yes**	1.41E+00	No
Chromium	mg/kg	9.03E+01	3.80E+01	**Yes**	2.01E+03	No
delta-BHC	mg/kg	5.60E-04	5.00E-04	**Yes**	3.51E-03	No
Dieldrin	mg/kg	8.90E-03	4.00E-03	**Yes**	2.62E-02	No
N-Nitrosodiphenylamine	mg/kg	1.41E-01	1.00E+00	No		
Nickel	mg/kg	2.28E+02	1.30E+02	**Yes**	9.83E+02	No
Nitrobenzene	mg/kg	1.32E-01	1.00E-01	**Yes**	1.00E-01	**Yes**
Pentachlorophenol	mg/kg	2.65E-01	3.00E-02	**Yes**	3.69E-02	**Yes**
Silver	mg/kg	8.06E-01	8.50E+00	No		
Tetrachloroethene	mg/kg	5.10E-03	6.00E-02	No		
Zinc	mg/kg	6.16E+03	6.20E+03	No		
CS-C						
Cadmium	mg/kg	1.74E+01	7.50E+00	**Yes**	8.22E+00	**Yes**
Chromium	mg/kg	5.83E+01	3.80E+01	**Yes**	2.01E+03	No
delta-BHC	mg/kg	1.00E-03	5.00E-04	**Yes**	4.47E-03	No
Dieldrin	mg/kg	1.10E-02	4.00E-03	**Yes**	3.34E-02	No
Nickel	mg/kg	3.57E+02	1.30E+02	**Yes**	9.84E+02	No

Table 1 (Revised Table G-3)
TACO Tier 2 SGW RO Comparison
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Constituent	Units	Exposure Point Concentration (EPC)	TACO Tier 1 Class I Soil-to-groundwater (SGW) RO	Is EPC>Tier 1 SGW?	TACO Tier 2 Class I Soil-to-groundwater (SGW) RO (a)	Is EPC>Tier 2 SGW?
CS-D						
Cadmium	mg/kg	4.00E+01	5.20E+00	**Yes**	8.22E+00	**Yes**
Chromium	mg/kg	5.70E+01	4.00E+01	**Yes**	2.01E+03	No
delta-BHC	mg/kg	1.90E-03	5.00E-04	**Yes**	4.35E-03	No
Dieldrin	mg/kg	6.90E-01	4.00E-03	**Yes**	3.25E-02	**Yes**
Nickel	mg/kg	5.30E+02	1.00E+02	**Yes**	9.83E+02	No
Zinc	mg/kg	8.20E+03	5.10E+03	**Yes**	3.65E+04	No
CS-E						
alpha-BHC	mg/kg	0.0005	5.00E-04	No	[redacted]	[redacted]
Cadmium	**mg/kg**	**2.31E+01**	**7.50E+00**	**Yes**	**8.23E+00**	**Yes**
Chromium	**mg/kg**	**7.27E+01**	**3.80E+01**	**Yes**	**2.01E+03**	**No**
Dieldrin	**mg/kg**	**2.26E-02**	**4.00E-03**	**Yes**	**3.00E-02**	**No**
Nickel	**mg/kg**	**2.67E+02**	**1.30E+02**	**Yes**	**9.84E+02**	**No**
Pentachlorophenol	mg/kg	2.07E-02	3.00E-02	No	[redacted]	[redacted]
Silver	mg/kg	1.38E+00	8.50E+00	No	[redacted]	[redacted]
CS-F						
1,1,2,2-Tetrachloroethane	mg/kg	4.40E-03	3.00E-03	**Yes**	3.00E-03	**Yes**
beta-BHC	mg/kg	1.10E-03	5.00E-04	**Yes**	2.50E-03	No
Cadmium	mg/kg	2.80E+01	1.10E+01	**Yes**	1.10E+01	**Yes**
Dieldrin	mg/kg	3.70E-03	4.00E-03	No	[redacted]	[redacted]
Nickel	mg/kg	3.29E+02	1.80E+02	**Yes**	9.85E+02	No
Pentachlorophenol	mg/kg	1.17E-02	2.00E-02	No	[redacted]	[redacted]
Zinc	mg/kg	5.37E+03	7.50E+03	No	[redacted]	[redacted]

Table 1 (Revised Table G-3)
TACO Tier 2 SGW RO Comparison
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Constituent	Units	Exposure Point Concentration (EPC)	TACO Tier 1 Class I Soil-to-groundwater (SGW) RO	Is EPC>Tier 1 SGW?	TACO Tier 2 Class I Soil-to-groundwater (SGW) RO (a)	Is EPC>Tier 2 SGW?
Site M						
1,4-Dichlorobenzene	mg/kg	4.10E+00	2.00E+00	**Yes**	2.84E+00	**Yes**
alpha-BHC	mg/kg	2.30E-03	5.00E-04	**Yes**	5.57E-03	No
Antimony	mg/kg	5.27E+00	5.00E+00	**Yes**	6.23E+00	No
Benzene	mg/kg	1.77E-02	3.00E-02	No	[redacted]	[redacted]
Chlorobenzene	mg/kg	1.20E+00	1.00E+00	**Yes**	1.84E+00	No
Chromium	mg/kg	2.59E+01	3.20E+01	No	[redacted]	[redacted]
Heptachlor epoxide	mg/kg	8.60E-01	7.00E-01	**Yes**	1.34E+00	No
Nickel	mg/kg	1.26E+03	7.00E+02	**Yes**	9.69E+02	**Yes**
Pentachlorophenol	mg/kg	1.90E-01	2.00E-02	**Yes**	4.84E-02	**Yes**

Notes:
FOD - Frequency of Detection.
RO - Remediation Objective.
TACO - Tiered Approach to Corrective Action Objectives.
EPC = 95% UCL
(a) In accordance with 35 Ill. Adm. Code 742, Section 742.600(f), if the Tier 2 RO is less than the Tier 1 RO, then the Tier 1 RO is used.

Table 2
Summary of Tier 2 Exceedances per Creek Segment
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Constituent	Exposure Point Concentration (EPC)	TACO Tier 2 Class I Soil-to-groundwater (SGW) RO(a)	Is EPC>Tier 2 SGW?
CS-B			
Cadmium	2.60E+01	8.22E+00	Yes
Nitrobenzene	1.32E-01	1.00E-01	Yes
Pentachlorophenol	2.65E-01	3.69E-02	Yes
CS-C			
Cadmium	1.74E+01	8.22E+00	Yes
CS-D			
Cadmium	4.00E+01	8.22E+00	Yes
Dieldrin	6.90E-01	3.25E-02	Yes
CS-E			
Cadmium	**2.31E+01**	**8.23E+00**	**Yes**
CS-F			
1,1,2,2-Tetrachloroethane	**4.40E-03**	**3.00E-03**	**Yes**
Cadmium	**2.80E+01**	**1.10E+01**	**Yes**
Site M			
1,4-Dichlorobenzene	4.10E+00	2.84E+00	Yes
Nickel	1.26E+03	9.69E+02	Yes
Pentachlorophenol	1.90E-01	4.84E-02	Yes

Notes:
RO - Remediation Objective.
TACO - Tiered Approach to Corrective Action Objectives.
EPC = 95% UCL
(a) In accordance with 35 Ill. Adm. Code 742, Section 742.600(f), if the Tier 2 RO is less than the Tier 1 RO, then the Tier 1 RO is used.

A. Calculation of the Dilution Factor (DF)

$$DF = 1 + \frac{K \cdot i \cdot d}{I \cdot L}$$

K	hydraulic conductivity	0.02 cm/s	6307.2 meters/year	Per EPA Comments
i	hydraulic gradient	0.001	0.001	"Dead Creek Final Remedy Engineering Evaluation/Feasibility Study Volume I, June 21, 2002."
d	mixing zone depth		(see attached)	
I	infiltration rate	0.3 m/yr	0.3 m/yr	Default TACO value
L	source length (stream width)			

Segment	L (meters)[1]	d (meters)[1]	DF
B	15	2.29	**4.21**
C	13	1.99	**4.22**
D	14	2.14	**4.22**
E	12	1.84	**4.22**
F	5	0.77	**4.22**
M	96	14.40	**4.15**

[1] - Stream width was averaged over stream length. "Dead Creek Final Remedy Creek Bottom Soil Engineering Evaulation/Cost Analysis Volume II, June 21, 2002"
d - mixing zone depth calculated according to Equation S25 in TACO guidance, calculation sheet attached

B. Summary Table of Input Parameters

	Gwobj[2] CLASS I (mg/L)	Koc[3]	Kd[4]
1,1,2,2-Tetrachloroethane	0.000055	524	
1,4-Dichlorobenzene	0.075	617	
alpha-BHC	0.00003	1,230	
Antimony	0.006		250
beta-BHC	0.00003	2,300	
Cadmium	0.005		390
Chromium	0.1		4,778
Chlorobenzene	0.1	219	
delta-BHC	0.00003	1,900	
Dieldrin	0.00002	21,400	
Heptachlor epoxide	0.0002	83,200	
Nickel	0.1		2,333
Nitrobenzene	0.0035	65	
Pentachlorophenol	0.001	592	
Zinc	5		1,731

[2] - TACO regulations, Appendix B Table E, except for 1,1,2,2-tetrachloroethane, which is from Region IX PRGs.
GWobj for beta-BHC and delta-BHC, assumed to be equal to alpha-BHC, as given in TACO guidance.
GWobj for Chromium is for total Chromium, as given in TACO guidance.
[3] - TACO regulations, Appendix C Table E, except for beta-BHC and delta-BHC, which are not reported in the TACO regulations and so, were taken from the PA Act 2 guidance.
[4] - From Sauve, Hendershot, and Allen. 2000. Except Antimony, which is from Sheppard and Thibault March, 1990.
For Antimony, it is assumed the soils are clay.

Calculating Mixing Zone
Inputs

L - source length (meters)	
Segment	
B	**15**
C	**13**
D	**14**
E	**12**
F	**5**
M	**96**
da - aquifer thickness (meters)	
	30
I - infiltration rate (m/yr)	
	0.3
K - hydraulic conductivity (m/yr)	
	6,300
i - hydraulic gradient	
	0.001

$d = (0.0112*L^2)^{0.5} + da\ (1-\exp(-L*I/(K*i*da)))$

Segment	-L*I/(K*i*da)	d
B	-0.02380952	2.29
C	-0.02063492	1.99
D	-0.02222222	2.14
E	-0.01904762	1.84
F	-0.00793651	0.77
M	-0.15238095	14.40

1,1,2,2

Cw (segment F)=	**0.0002**	=DF segment F*Gwobj for chemical
ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
Koc =	524	organic partition coefficient for chemical

Segment	**foc**	**Kd**
F	0.0085	**4.476**

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	**EPC/95% UCL**	**pass?**	Arithmetic Mean	pass?
Segment F	**0.001081**	1.00E-02	no	**0.004432**	**no**	0.00391094	no

beta-BHC

Cw (segment B)= **0.0001** =DF segment B*Gwobj for chemical
Cw (segment F)= **0.0001** =DF segment F*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 2,300 organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	**33.372**
F	0.0085	**19.647**

θ_w = **0.20** water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**0.0042**	0.0077	no	**0.001496**	**yes**	1.25E-03	yes
Segment F	**0.0025**	0.0039	no	**0.001135**	**yes**	8.21E-04	yes

cadmium

Cw (segment B)=	**0.0211**	=DF segment B*Gwobj for chemical
Cw (segment C)=	**0.0211**	=DF segment C*Gwobj for chemical
Cw (segment D)=	**0.0211**	=DF segment D*Gwobj for chemical
Cw (segment E)=	**0.0211**	=DF segment E*Gwobj for chemical
Cw (segment F)=	**0.0211**	=DF segment F*Gwobj for chemical
ρ_b =	**1.8**	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	**390**	
θ_w =	**0.32**	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**8.22**	54	no	26.02	no	8.25	no
Segment C	**8.22**	24	no	17.42	no	13.28	no
Segment D	**8.22**	40	no	40.00	no	19.75	no
Segment E	**8.23**	38	no	23.07	no	14.21	no
Segment F	**8.24**	57	no	27.98	no	20.31	no

chlorobenzene

Cw (segment B)= **0.4214** =DF segment B*Gwobj for chemical
Cw (segment M)= **0.4154** =DF segment M*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 219 *organic partition coefficient for chemical*

Segment	foc	Kd
B	0.0145	**3.178**
M	0.0194	**4.244**

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	EPC	pass?	Arithmetic Mean	pass?
Segment B	**1.414039**	9.7	no	1.3890	yes	0.4497	yes
Segment M	**1.836707**	1.2	yes	1.2000	yes	0.3384	yes

DRAFT

chromium

Cw (segment B)=	**0.4214**	=DF segment B*Gwobj for chemical
Cw (segment C)=	**0.4216**	=DF segment C*Gwobj for chemical
Cw (segment D)=	**0.4215**	=DF segment D*Gwobj for chemical
Cw (segment E)=	**0.4217**	=DF segment E*Gwobj for chemical
ρ_b =	**1.8**	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	**4778**	
Θ_w =	**0.32**	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**2013.66**	180	yes	90.25	yes	51.27	yes
Segment C	**2014.41**	110	yes	58.27	yes	36.11	yes
Segment D	**2014.04**	57	yes	57.00	yes	49.33	yes
Segment E	**2014.79**	170	yes	72.72	yes	47.29	yes

Cw (segment B)= **0.0001** =DF segment B*Gwobj for chemical
Cw (segment C)= **0.0001** =DF segment C*Gwobj for chemical
Cw (segment D)= **0.0001** =DF segment D*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 1,900 *organic partition coefficient for chemical*

Segment	foc	Kd
B	0.0145	**27.568**
C	0.0185	**35.150**
D	0.0180	**34.200**

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**0.003508**	0.0041	no	0.0006	yes	0.0005	yes
Segment C	**0.004468**	9.90E-04	yes	0.0010	yes	0.0007	yes
Segment D	**0.004347**	1.90E-03	yes	*0.0019*	yes	*0.0008*	yes

Cw (segment B)= **0.000084** =DF segment B*Gwobj for chemical
Cw (segment C)= **0.000084** =DF segment C*Gwobj for chemical
Cw (segment D)= **0.000084** =DF segment D*Gwobj for chemical
Cw (segment E)= **0.000084** =DF segment E*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 21,400 organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	**310.502**
C	0.0185	**395.900**
D	0.0180	**385.200**
E	0.0166	**355.691**

θ_w = **0.32** water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**0.03**	0.049	no	0.008943	yes	0.00771681	yes
Segment C	**0.03**	0.011	yes	0.011	yes	0.00475667	yes
Segment D	**0.03**	0.69	no	0.69	no	0.12743333	no
Segment E	**0.03**	0.034	no	0.022598	yes	0.00548941	yes

Cw (segment M)= **0.0008** =DF segment M*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 83,200 organic partition coefficient for chemical

Segment	**foc**	**Kd**
M	0.0194	**1612.416**

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment M	**1.339603**	0.86	yes	0.8600	yes	0.1080	yes

nickel

Cw (segment B)=	**0.4214**	=DF segment B*Gwobj for chemical
Cw (segment C)=	**0.4216**	=DF segment C*Gwobj for chemical
Cw (segment D)=	**0.4215**	=DF segment D*Gwobj for chemical
Cw (segment E)=	**0.4217**	=DF segment E*Gwobj for chemical
Cw (segment F)=	**0.4222**	=DF segment F*Gwobj for chemical
Cw (segment M)=	**0.4154**	=DF segment M*Gwobj for chemical
ρ_b =	**1.8**	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	**2333**	
θ_w =	**0.32**	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**983.27**	630	yes	228.44	yes	192	yes
Segment C	**983.63**	570	yes	357.19	yes	263	yes
Segment D	**983.45**	530	yes	530.00	yes	287	yes
Segment E	**983.82**	600	yes	267.07	yes	181	yes
Segment F	**985.10**	630	yes	329.80	yes	167	yes
Segment M	**969.10**	1500	no	1260.59	no	480	yes

Cw (segment B)= **0.0148** =DF segment B*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 65 organic partition coefficient for chemical

Segment	**foc**	**Kd**
B	0.0145	**0.937**

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**0.016448**	0.52	no	0.1321	no	0.1266	no

pentachlorophenol

Cw (segment B)= **0.0042** =DF segment B*Gwobj for chemical
Cw (segment M)= **0.0042** =DF segment M*Gwobj for chemical

ρ_b = **1.8** dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 592 organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	**8.590**
M	0.0194	**11.473**

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**0.036948**	44	no	0.2647	no	0.9874	no
Segment M	**0.048392**	0.29	no	0.1928	no	0.0637	no

zinc

Cw (segment D)=	**21.0754**	=DF segment D*Gwobj for chemical
ρ_b =	**1.8**	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	**1731**	
θ_w =	**0.32**	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC	pass?	Arithmetic Mean	pass?
Segment D	**36485.20**	8200	yes	8200.00	yes	4100	yes

Cw (segment M)=	**0.3115**	=DF segment M*Gwobj for chemical
ρ_b =	**1.8**	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
Koc =	617	organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	8.952

θ_w = **0.32**

	Revised TACO Standard	Maximum Detect	pass?	EPC	pass?	Arithmetic Mean	pass?
Segment M	**2.84**	4.1	no	**4.1**	**no**	0.97833333	**yes**

alpha-BHC

Cw (segment B)=	**0.0001**	=DF segment B*Gwobj for chemical
Cw (segment M)=	**0.0001**	=DF segment M*Gwobj for chemical
ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
Koc =	2300	organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	33.372
M	0.0194	44.574

θ_w = **0.20** water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment B	**0.004**	2.90E-03	yes	**0.000699**	yes	5.85E-04	yes
Segment M	**0.006**	2.30E-03	yes	**0.0023**	yes	1.48E-03	yes

antimony

Cw (segment M)=	**0.0249**	=DF segment M*Gwobj for chemical
ρ_b =	**1.8**	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	**250**	
θ_w =	**0.32**	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	EPC/95% UCL	pass?	Arithmetic Mean	pass?
Segment M	**6.23**	6.80	no	**5.27**	**yes**	2.91	yes

C. Input values for Taco Equation

Remediation Objective (mg/kg) = C_w *(K_d +((Θ_w + Θ_a*H')/ρ_b))
For Θ_a = 0, Remediation Objective (mg/kg) = C_w *(K_d +(Θ_w/ρ_b))

C_w =	DF*GWobj	
θ_a =	0	air filled porosity for sand, assumed saturated.
θ_w =	0.32	water filled soil porosity.
ρ_b =	1.8	dry soil bulk density for sand, TACO default for sand.
K_d =	Koc * foc	For organics, fixed value for inorganics.

Segment	foc[a]
B	0.0145
C	0.0185
D	0.0180
E	0.0166
F	0.0085
M	0.0194

[a] - foc was calculated from TOC field data.
foc was averaged over each stream segment.

APPENDIX B2

ORIGINAL EVALUATION OF POTENTIAL LEACHING FROM CREEK BOTTOM SOILS

APPENDIX G
SOIL TO GROUNDWATER EVALUATION

1.0 INTRODUCTION

The objective of this evaluation is to characterize the potential for residual concentrations of constituents detected in creek bottom soils to leach to underlying groundwater. This evaluation was conducted by comparing detected constituent concentrations in creek bottom soils to the Illinios Environmental Protection Agency (IEPA) Tiered Approach to Corrective Action Objectives (TACO) (IEPA, 1998) Tier 1 Remediation Objectives (ROs) for the soil to groundwater pathway for Class 1 groundwater. For those constituents that exceed Class 1 Tier 1 SGW ROs, concentrations were compared to calculated Class 1 Tier 2 SGW ROs. Since Dead Creek is divided into five segments (Creek Segments B, C, D, E and F), these comparisons were done on a creek segment by creek segment basis. Comparisons for Site M, a small lagoon located on the east bank of Creek Segment B just north of Judith Lane, were done separately from the creek segments.

Before addressing the ROs, it is important to put this potential exposure pathway (i.e., potential constituent leaching to groundwater and subsequent exposure to constituents in groundwater by a human receptor) into context. Dead Creek can best be characterized as an intermittent stream in a highly industrialized section of Sauget and Cahokia, Illinois. There is a groundwater use restriction for this area that, among other things, prevents the drinking of water from this aquifer (see Appendix S of ENSR, 2001). Therefore, there is no direct human contact with groundwater. In addition, this analysis is predicated on several worst-case assumptions regarding the hydrology of the site and use of groundwater, including the assumption that Dead Creek discharges surface water to the groundwater.

The Class I Tier 1 evaluation is presented in Section 2, the Class I Tier 2 evaluation is presented in Section 3. The results are discussed in Section 4, Section 5 provides a summary, and Section 6 provides references.

2.0 CLASS I TIER 1 EVALUATION

For the first step in the SGW pathway evaluation, the maximum detected concentration of each constituent in creek bottom soils for each segment is compared to TACO Class I Tier 1 SGW ROs, as shown in **Table G-1.** **Table G-2**, which is summarized below, lists constituents whose maximum detected concentration exceeds Class 1 Tier 1 SGW ROs in each creek segment:

Creek Segment B

VOCs	Benzene, Chlorobenzene, Tetrachloroethane
SVOCs	4-Chloroaniline, Carbazole; 1,2-Dichlorobenzene; 1,4-Dichlorobenzene; 2,4-Dichlorophenol, N-Nitrosodiphenylamine, Nitrobenezene, Pentachlorophenol; 1,2,4-Trichlorobenzene; 2,4,6-Trichlorophenol
Pesticides	alpha-BHC, beta-BHC, delta-BHC, Dieldrin
Metals	Arsenic, Cadmium, Chromium, Nickel, Silver, Zinc

Site M

VOCs	Benzene, Chlorobenzene
SVOCs	1,4-Dichlorobenzene, Pentachlorophenol
Pesticides	alpha-BHC, Heptaclor epoxide
Metals	Antimony, Chromium, Nickel

Creek Segment C

Pesticides	delta-BHC, Dieldrin
Metals	Cadmium, Chromium, Nickel

Creek Segment D

Pesticides	delta-BHC, Dieldrin
Metals	Cadmium, Chromium, Nickel, Zinc

Creek Segment E

SVOCs	Pentachlorophenol
Pesticides	alpha-BHC, Dieldrin
Metals	Cadmium, Chromium, Nickel, Silver

Creek Segment F

VOCs	1,1,2,2-Tetrachloroethane
SVOCs	Pentachlorophenol
Pesticides	beta-BHC, Dieldrin
Metals	Cadmium, Nickel, Zinc

Because an evaluation of the maximum detected concentration provides a very conservative, or worst case, estimate of leaching to groundwater, the average (arithmetic mean) concentration for each of the constituents listed in **Table G-2** is compared to the Class I Tier 1 SGW ROs, as shown in **Table G-3** and summarized below:

Creek Segment B

SVOCs	Nitrobenezene, Pentachlorophenol
Pesticides	alpha-BHC, beta-BHC, delta-BHC, Dieldrin
Metals	Cadmium, Chromium, Nickel

Site M

SVOCs	Pentachlorophenol
Pesticides	alpha-BHC

Creek Segment C

Pesticides	delta-BHC, Dieldrin
Metals	Cadmium, Nickel

Creek Segment D

Pesticides	delta-BHC, Dieldrin
Metals	Cadmium, Chromium, Nickel

Creek Segment E

Pesticides	Dieldrin
Metals	Cadmium, Chromium, Nickel

Creek Segment F

VOCs	1,1,2,2-Tetrachloroethane
Pesticides	beta-BHC
Metals	Cadmium

These constituents are further evaluated in Tier 2.

3.0 CLASS I TIER 2 EVALUATION

A Class I Tier 2 SGW RO was calculated for each occurrence where the average concentration exceeded the Class I Tier 1 SGW RO exceedance in each creek segment using equation S17 in the IEPA TACO guidance document (IEPA, 1998).

3.1 Tier 2 Equations

The Tier 2 SGW RO equation follows as do supporting equations.

$$RO = Cw * (Kd + ((\theta w + \theta a * H')/\rho_b))$$

(Eq. S17. IEPA, 1998) Where: θw – water filled soil porosity

θa – air filled porosity, assumed to be 0

H' – Henry's law constant

ρ_b – dry soil bulk density

Kd – soil to water partition coefficient

Because creek bottom soils are typically saturated, $\theta a = 0$ and the RO equation becomes:

$$RO = Cw * (Kd + (\theta w/\rho_b))$$

$$Cw = DF * Gwobj$$

(Eq. S18. IEPA, 1998)

Where: Cw - target soil leachate concentration

Gwobj - Class I groundwater objective

$$DF = 1+\frac{K*i*d}{I*L}$$

(Eq. 22. IEPA, 1998)

Where:DF - dilution factor for transport and mixing of soil water to groundwater

K - saturated hydraulic conductivity

i - hydraulic gradient

d - mixing zone depth in groundwater

I - infiltration rate

L - source length parallel to groundwater flow

$$Kd(L/kg) \text{ for inorganics} = \frac{\text{Concentration constituent in soil (mg/kg)}}{\text{Concentration of constituent in extractant (mg/L)}}$$

(Sheppard and Thibault, 1990)

However, literature values are typically used for Kd.

$$Kd(L/kg) \text{ for organics} = Koc * foc$$

(Eq. S19. IEPA, 1998)

Where: Koc – organic carbon partition coefficient

foc – organic carbon content of soil (field data)

3.2 Tier 2 Input Variables

This section describes some of the input variables used in the development of the Class I Tier 2 SGW ROs. In the calculation of the Tier 2 SGW ROs, non-default values (i.e., site-specific) were used for DF, foc, and Kd. These are discussed below.

Source Length, L

Based on groundwater flow direction, source length is the length of the area of interest that is parallel to groundwater flow. For this calculation, this is equivalent to the stream width of Dead Creek. Based on the maps in Section 2 of this report ("Creek Bottom Soil Engineering Evaluation/Cost Analysis Volume II Human Health Risk Assessment"), average widths were calculated for each creek segment. Four to seven widths were measured and averaged for each creek segment. Average stream widths ranged from 5 meters in CS-F to almost 100 meters for Site M, the lagoon. The creek widths are summarized in the spreadsheets in **Attachment A**.

Organic Carbon Content of Soils, foc

Values for organic carbon content of soils, foc, are used in the Tier 2 SGW RO equations for organic constituents. Creek bottom soils were sampled at a number of locations in each creek segment and analyzed for Total Organic Carbon (TOC). TOC was converted to a decimal percent to arrive at an foc value. Average foc was calculated for each creek segment. The averages ranged from 0.0085 in CS-F to 0.019 at Site M. The foc's are shown on **Table G-4** and are used in the calculations in **Attachment A**.

Soil-Water Partition Coefficient, Kd

The TACO program provides default Kd values for calculating the Tier 1 ROs. As an alternative to a default value, when the constituent of interest is a metal, a Kd value from a published table may be used. In their article, "Solid Solution Partitioning of Metals in Contaminated Soils: Dependence on pH, Total Metal Burden, and Organic Matter," Sauve, Hendershot and Allen (2000) cite Kd values for a number of metals, including the constituents present in the creek bottom soils (barium, cadmium, copper, mercury, nickel, selenium, zinc). The median Kd value cited by Sauve, et al., for each of these constituents was selected for use in the Tier 2 calculations. The selected values are listed in **Attachment A**.

3.3 Tier 2 Results

Table G-3 shows those constituents whose average concentrations are greater than the Class I Tier 1 SGW RO. The Class I Tier 2 SGW RO was then developed for each of these constituents using the equations and inputs presented above. The calculations are presented in **Attachment A**. The results are provided on **Table G-3**. The following creek segments had detections of constituents that were greater than the Class I Tier 2 SGW ROs.

- In CS-B, the average concentrations of cadmium, dieldrin, nitrobenzene, and pentachlorophenol are greater than Class I Tier 2 SGW ROs.
- In CS-C, the average concentration of cadmium is greater than the Class I Tier 2 SGW RO.
- In CS-D, the average concentrations of cadmium and dieldrin are greater than the Class I Tier 2 SGW ROs.
- In CS-E, the average concentration of cadmium is greater than Class I Tier 2 SGW RO.
- In CS-F, the average concentrations of 1,1,2,2-tetrachloroethane and cadmium are greater than the Class I Tier 2 SGW ROs.
- At Site M, the average concentration of pentachlorophenol is greater than the Class I Tier 2 SGW RO.

4.0 DISCUSSION

The TACO SGW ROs are developed based on models that assume certain behaviors for constituents in soils to predict their potential impact on underlying groundwater quality. The physical and chemical interactions of constituents in soils are complex, and the models used to predict this behavior are by necessity simplistic and are by design conservative, i.e., the models are designed to over- rather than under-estimate constituent migration. While the models are used as conservative screening tools, direct measurements of soil and groundwater constituent concentrations provide the best indicators of potential impact. Leaching to groundwater can take time before an impact in groundwater can be measured. Recent sources or releases would not be expected to have immediate impacts on groundwater quality, and conversely, if relatively old releases had the potential to impact groundwater quality, that impact should be easily determined by sampling downgradient groundwater. Ideally, wells both adjacent and downgradient of a potential release area would be used to assess potential groundwater impact.

The soil to groundwater pathway evaluation presented here used the TACO models to evaluate the maximum detected concentration of each constituent in creek bottom soils of each creek segment with respect to a Class I, or drinking water, aquifer. As shown in **Table G-2**, a number of exceedances were identified for each creek segment. These constituents were evaluated using Tier 2 methods, and as noted in Section 3.3, 1,1,2,2-tetrachloroethane, cadmium, dieldrin, nitrobenzene and pentachlorophenol were identified as exceeding Class 1 Tier 2 SGW ROs.

Tier 2 methodology predicts that cadmium, dieldrin, nitrobenzene and pentachlorophenol will leach from creek bottom soils in Creek Segment B at concentrations higher than their respective Class 1 Tier 2 SGW ROs. As part of the Sauget Area 1 EE/CA and RI/FS evaluation, a number of wells were sampled in the vicinity of CS-B and Site M. These are shown on Figure 3-2 of ENSR, 2001, and this figure is included here as Attachment B. Those wells that are downgradient of CS-B and Site M, and that are not located within or immediately adjacent to Site G, are listed on Table G-5. There are 15 wells total. Two of the wells, EEG-103 and EEG-105, are immediately downgradient of CS-B, and EEG-105 is also immediately downgradient of Site M. The remaining wells are at varying downgradient distances. Table G-5 also compares detected concentrations of 1,1,2,2-tetrachloroethane, cadmium, dieldrin, nitrobenzene and pentachlorophenol in each well to TACO Class I groundwater ROs. The results of the comparison are summarized below:

AA-SW-S1	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
AA-SW-S2	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
AA-SW-S3	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
AA-GHL-S2	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
AA-GHL-S3	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
EEG-104	Dieldrin was detected below the Class I Groundwater RO.
EEG-103	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
EEG-105	Pentachlorophenol was detected below the Class I Groundwater RO.
EEG-111	Pentachlorophenol was detected below the Class I Groundwater RO.
SGW-S1	Dieldrin was detected below the Class I Groundwater RO.
DW-MCDO	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
DW-SCHM	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
DW-SETT	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.
DW-WRIG	Cadmium was detected below the Class I Groundwater RO.
SGW-2	None of the constituents exceeding Class 1 Tier 2 SGW ROs were detected.

As the constituents in both the sediments and the creek-bottom soils from all of the creek segments have been in place for many years, it can conservatively be assumed that ample time has occurred for leaching of constituents to groundwater, and that if the constituents in CS-B and Site M have served as a source to underlying groundwater, that the groundwater data would verify this.

None of the constituents with Class 1 Tier 1 SGW RO exceedances in CS-B and Site M were detected in downgradient wells at concentrations exceeding TACO Class 1 Groundwater ROs. It is also important to note that the majority of these constituents were not detected in wells downgradient of CS-B and Site M. Therefore, although the conservative TACO Class I Tier 1 SGW evaluation would indicate that the creek bottom soils could serve as a source of constituents to underlying groundwater, the groundwater data do not bear this out.

There are no wells located downgradient from the other creek segments. However, the conditions at CS-B and Site M can be extrapolated to these other segments. **Table G-6** presents the concentrations of constituents identified as exceedances in CS-C through CS-F to concentrations in CS-B and Site M. The concentrations are all below those in CS-B and Site M with the exceptions noted below.

Dieldrin was detected at concentrations approximately 10-fold higher in CS-D than in CS-B creek bottom soils, however it seems to have wide-spread occurrence in the area and it is not associated with the Sauget Area 1 source areas.

Zinc has a maximum detected concentration in CS-F that is greater than the maximum detected concentration in CS-B, however, the average and 95% UCL concentrations for the two segments are similar, therefore, it is concluded that zinc does not pose a risk to underlying groundwater quality.

Silver concentrations in CS-E are above, but only slightly above those in CS-B. In addition, the frequency of detection was low in this segment (3:17), therefore, it is concluded that silver does not pose a risk to underlying groundwater quality.

And finally, 1,1,2,2-tetrachloroethane was detected only once in CS-F, and was not detected in CS-B. In fact, it was only detected once in the entire stretch of the creek. Therefore, it is concluded that 1,1,2,2-tetrachloroethane does not pose a risk to underlying groundwater quality.

5.0 SUMMARY

In summary, although the conservative TACO Class I Tier 1 and Tier 2 SGW RO screening process would suggest that the creek bottom soils remaining in Dead Creek and Site M may have the potential to adversely affect underlying groundwater quality, review of actual groundwater data downgradient of the creek does not bear this out. In addition, there is a groundwater use restriction for this area that, among other things, prevents the drinking of water from this aquifer (see Appendix S of ENSR, 2001). Therefore, there is no direct human contact with groundwater. Therefore, it is concluded that the creek bottom soils in CS-B, CS-C, CS-D, CS-E, CS-F and Site M are not serving as a source of constituents to underlying groundwater and do not pose a threat to human health via this pathway.

6.0 REFERENCES

ENSR. 2001. Sauget Area 1 EE/CA and RI/FS, Volume II, Human Health Risk Assessment, Sauget Area 1, Sauget and Cahokia, Illinois. June 2001.

IEPA. 1998. Tiered Approach to Corrective Action Objectives. Title 35, Subtitle G, Chapter I, Subchapter J, Part 742. As amended June 8, 1998. Illinois Environmental Protection Agency.

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Sauve, Sebastian, William Hendershot, and Herbert E. Allen. 2000. Solid Solution Partitioning of Metals in Contaminated Soils: Dependence on pH, Total Metal Burden, and Organic Matter. Environmental Science and Technology. 34(7): 1125-1131.

TABLES

Table G-1
Tier 1 Class I Soil-to-Groundwater TACO Screen
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSB	71-55-6	1,1,1-Trichloroethane	mg/kg	3 : 48 : 49	4.15E-03	2.30E-02	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSB	120-82-1	1,2,4-Trichlorobenzene	mg/kg	6 : 49 : 49	2.28E+00	8.00E+01	No	ND	--	No	5.00E+00	Yes	Yes	>SGW
CBS-CSB	95-50-1	1,2-Dichlorobenzene	mg/kg	6 : 49 : 49	1.67E+00	5.30E+01	No	ND	--	No	1.70E+01	Yes	Yes	>SGW
CBS-CSB	540-59-0	1,2-Dichloroethene (total)	mg/kg	1 : 48 : 49	3.85E-03	1.20E-02	No	ND	--	No	4.00E-01	No	No	<SGW
CBS-CSB	541-73-1	1,3-Dichlorobenzene	mg/kg	1 : 4 : 49	1.00E-01	1.00E-01	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSB	106-46-7	1,4-Dichlorobenzene	mg/kg	7 : 49 : 49	2.93E-01	5.50E+00	No	ND	--	No	2.00E+00	Yes	Yes	>SGW
CBS-CSB	1746-01-6	2,3,7,8-TCDD-TEQ	mg/kg	49 : 49 : 49	2.42E-04	4.54E-03	No	1.24E-05	Yes	No	NA	No	No	NA
CBS-CSB	93-76-5	2,4,5-T	mg/kg	12 : 48 : 49	2.42E-04	6.10E-01	No	ND	--	No	NA	No	No	NA
CBS-CSB	93-72-1	2,4,5-TP (Silvex)	mg/kg	3 : 3 : 49	2.42E-04	2.00E-03	No	ND	--	No	1.10E+01	No	No	<SGW
CBS-CSB	95-95-4	2,4,5-Trichlorophenol	mg/kg	1 : 49 : 49	2.42E-04	2.40E-01	No	ND	--	No	2.70E+02	No	No	<SGW
CBS-CSB	88-06-2	2,4,6-Trichlorophenol	mg/kg	5 : 49 : 49	2.42E-04	4.30E+00	No	ND	--	No	1.50E-01	Yes	Yes	>SGW
CBS-CSB	94-75-7	2,4-D	mg/kg	3 : 47 : 49	2.42E-04	1.40E-01	No	2.03E-02	Yes	No	1.50E+00	No	No	<SGW
CBS-CSB	94-82-6	2,4-DB	mg/kg	2 : 47 : 49	7.60E-03	5.70E-02	No	ND	--	No	NA	No	No	NA
CBS-CSB	120-83-2	2,4-Dichlorophenol	mg/kg	5 : 49 : 49	2.69E-01	6.60E+00	No	ND	--	No	1.00E+00	Yes	Yes	>SGW
CBS-CSB	78-93-3	2-Butanone (MEK)	mg/kg	29 : 48 : 49	3.50E-02	6.10E-01	No	4.99E-02	Yes	No	NA	No	No	NA
CBS-CSB	95-57-8	2-Chlorophenol	mg/kg	3 : 49 : 49	1.25E-01	5.10E-01	No	ND	--	No	3.90E+00	No	No	<SGW
CBS-CSB	591-78-6	2-Hexanone	mg/kg	1 : 48 : 49	1.96E-02	7.70E-02	No	ND	--	No	NA	No	No	NA
CBS-CSB	91-57-6	2-Methylnaphthalene	mg/kg	3 : 49 : 49	3.53E-01	7.30E+00	No	ND	--	No	8.40E+01	No	No	<SGW
CBS-CSB	106-44-5	3&4Methylphenol	mg/kg	1 : 49 : 49	1.48E-01	1.60E+00	No	ND	--	No	1.50E+01	No	No	<SGW
CBS-CSB	72-54-8	4,4'-DDD	mg/kg	3 : 49 : 49	1.60E-02	4.70E-01	No	ND	--	No	1.60E+01	No	No	<SGW
CBS-CSB	72-55-9	4,4'-DDE	mg/kg	2 : 44 : 49	3.59E-03	3.50E-02	No	ND	--	No	5.40E+01	No	No	<SGW
CBS-CSB	50-29-3	4,4'-DDT	mg/kg	15 : 48 : 48	1.83E-02	1.60E-01	No	ND	--	No	3.20E+01	No	No	<SGW
CBS-CSB	106-47-8	4-Chloroaniline	mg/kg	5 : 49 : 49	5.94E-01	1.10E+01	No	ND	--	No	7.00E-01	Yes	Yes	>SGW
CBS-CSB	108-10-1	4-Methyl-2-pentanone (MIBK)	mg/kg	5 : 48 : 49	2.03E-02	1.10E-01	No	ND	--	No	NA	No	No	NA
CBS-CSB	100-01-6	4-Nitroaniline	mg/kg	2 : 49 : 49	7.59E-01	9.00E+00	No	ND	--	No	NA	No	No	NA
CBS-CSB	100-02-7	4-Nitrophenol	mg/kg	1 : 1 : 49	4.40E-01	4.40E-01	No	ND	--	No	NA	No	No	NA
CBS-CSB	83-32-9	Acenaphthene	mg/kg	2 : 49 : 49	1.32E-01	8.60E-01	No	ND	--	No	5.70E+02	No	No	<SGW
CBS-CSB	208-96-8	Acenaphthylene	mg/kg	1 : 49 : 49	1.20E-01	2.40E-01	No	ND	--	No	5.70E+02	No	No	<SGW
CBS-CSB	67-64-1	Acetone	mg/kg	38 : 48 : 49	1.16E-01	4.70E-01	No	1.56E-01	Yes	No	1.60E+01	No	No	<SGW
CBS-CSB	309-00-2	Aldrin	mg/kg	1 : 1 : 49	3.60E-04	3.60E-04	No	ND	--	No	5.00E-01	No	No	<SGW
CBS-CSB	319-84-6	alpha-BHC	mg/kg	9 : 44 : 49	5.85E-04	2.90E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSB	7429-90-5	Aluminum	mg/kg	49 : 49 : 49	9.35E+03	2.00E+04	No	2.90E+04	No	Yes	NA	No	No	<BK
CBS-CSB	120-12-7	Anthracene	mg/kg	4 : 49 : 49	1.48E-01	1.40E+00	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSB	7440-36-0	Antimony	mg/kg	4 : 46 : 49	1.45E+00	3.90E+00	No	2.75E+00	Yes	No	5.00E+00	No	No	<SGW
CBS-CSB	7440-38-2	Arsenic	mg/kg	49 : 49 : 49	9.72E+00	4.40E+01	No	1.44E+01	Yes	No	2.90E+01	Yes	Yes	>SGW
CBS-CSB	7440-39-3	Barium	mg/kg	49 : 49 : 49	2.98E+02	1.50E+03	No	4.13E+02	Yes	No	1.60E+03	No	No	<SGW
CBS-CSB	71-43-2	Benzene	mg/kg	19 : 49 : 49	8.31E-03	1.80E-01	No	ND	--	No	3.00E-02	Yes	Yes	>SGW
CBS-CSB	56-55-3	Benzo(a)anthracene	mg/kg	4 : 49 : 49	1.69E-01	1.90E+00	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSB	50-32-8	Benzo(a)pyrene	mg/kg	7 : 49 : 49	1.09E-01	1.20E+00	No	ND	--	No	8.00E+00	No	No	<SGW
CBS-CSB	205-99-2	Benzo(b)fluoranthene	mg/kg	6 : 49 : 49	1.56E-01	1.40E+00	No	ND	--	No	5.00E+00	No	No	<SGW
CBS-CSB	191-24-2	Benzo(g,h,i)perylene	mg/kg	6 : 49 : 49	1.38E-01	8.90E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSB	207-08-9	Benzo(k)fluoranthene	mg/kg	5 : 49 : 49	1.49E-01	9.00E-01	No	ND	--	No	4.90E+01	No	No	<SGW
CBS-CSB	7440-41-7	Beryllium	mg/kg	36 : 49 : 49	5.39E-01	1.30E+00	No	1.56E+00	No	Yes	6.30E+01	No	No	<SGW

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSB	319-85-7	beta-BHC	mg/kg	10 : 46 : 49	1.25E-03	7.70E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSB	117-81-7	Bis(2-ethylhexyl)phthalate	mg/kg	5 : 49 : 49	1.77E+00	8.10E+01	No	ND	--	No	3.60E+03	No	No	<SGW
CBS-CSB	85-68-7	Butylbenzylphthalate	mg/kg	2 : 49 : 49	1.80E-01	3.20E+00	No	ND	--	No	9.30E+02	No	No	<SGW
CBS-CSB	7440-43-9	Cadmium	mg/kg	46 : 49 : 49	8.25E+00	5.40E+01	No	8.30E-01	Yes	No	7.50E+00	Yes	Yes	>SGW
CBS-CSB	7440-70-2	Calcium	mg/kg	49 : 49 : 49	6.49E+03	2.10E+04	Yes	2.70E+04	No	Yes	NA	No	No	EN
CBS-CSB	86-74-8	Carbazole	mg/kg	1 : 49 : 49	1.28E-01	6.20E-01	No	ND	--	No	6.00E-01	Yes	Yes	>SGW
CBS-CSB	75-15-0	Carbon disulfide	mg/kg	19 : 48 : 49	1.10E-02	7.70E-02	No	ND	--	No	3.20E+01	No	No	<SGW
CBS-CSB	108-90-7	Chlorobenzene	mg/kg	38 : 49 : 49	4.50E-01	9.70E+00	No	ND	--	No	1.00E+00	Yes	Yes	>SGW
CBS-CSB	67-66-3	Chloroform	mg/kg	1 : 5 : 49	2.72E-03	3.10E-03	No	ND	--	No	6.00E-01	No	No	<SGW
CBS-CSB	7440-47-3	Chromium	mg/kg	49 : 49 : 49	5.13E+01	1.80E+02	No	4.00E+01	Yes	No	3.80E+01	Yes	Yes	>SGW
CBS-CSB	218-01-9	Chrysene	mg/kg	5 : 49 : 49	1.67E-01	1.90E+00	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSB	7440-48-4	Cobalt	mg/kg	49 : 49 : 49	8.55E+00	2.30E+01	No	1.72E+01	Yes	No	NA	No	No	NA
CBS-CSB	7440-50-8	Copper	mg/kg	49 : 49 : 49	4.84E+02	1.00E+04	No	3.80E+01	Yes	No	1.30E+05	No	No	<SGW
CBS-CSB	57-12-5	Cyanide	mg/kg	3 : 49 : 49	3.79E-01	1.10E+00	No	ND	--	No	4.00E+01	No	No	<SGW
CBS-CSB	75-99-0	Dalapon	mg/kg	1 : 5 : 49	3.95E-02	4.10E-02	No	ND	--	No	8.50E-01	No	No	<SGW
CBS-CSB	319-86-8	delta-BHC	mg/kg	2 : 44 : 49	5.27E-04	4.10E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSB	84-74-2	di-n-Butylphthalate	mg/kg	7 : 49 : 49	1.15E-01	2.10E-01	No	ND	--	No	2.30E+03	No	No	<SGW
CBS-CSB	53-70-3	Dibenzo(a,h)anthracene	mg/kg	3 : 49 : 49	7.20E-02	3.40E-01	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSB	132-64-9	Dibenzofuran	mg/kg	1 : 49 : 49	1.48E-01	1.60E+00	No	ND	--	No	NA	No	No	NA
CBS-CSB	1918-00-9	Dicamba	mg/kg	12 : 12 : 49	2.84E-03	5.30E-03	No	ND	--	No	NA	No	No	NA
CBS-CSB	120-36-5	Dichlorprop	mg/kg	1 : 1 : 49	6.60E-03	6.60E-03	No	ND	--	No	NA	No	No	NA
CBS-CSB	60-57-1	Dieldrin	mg/kg	8 : 47 : 49	7.72E-03	4.90E-02	No	ND	--	No	4.00E-03	Yes	Yes	>SGW
CBS-CSB	33213-65-9	Endosulfan II	mg/kg	1 : 42 : 49	2.60E-03	1.00E-02	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSB	1031-07-8	Endosulfan sulfate	mg/kg	1 : 44 : 49	2.85E-03	1.20E-02	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSB	53494-70-5	Endrin ketone	mg/kg	3 : 3 : 49	9.57E-04	1.50E-03	No	ND	--	No	1.00E+00	No	No	<SGW
CBS-CSB	100-41-4	Ethylbenzene	mg/kg	7 : 49 : 49	1.14E-01	3.20E+00	No	ND	--	No	1.30E+01	No	No	<SGW
CBS-CSB	206-44-0	Fluoranthene	mg/kg	9 : 49 : 49	2.35E-01	4.00E+00	No	ND	--	No	4.30E+03	No	No	<SGW
CBS-CSB	86-73-7	Fluorene	mg/kg	2 : 49 : 49	1.86E-01	3.50E+00	No	ND	--	No	5.60E+02	No	No	<SGW
CBS-CSB	58-89-9	gamma-BHC (Lindane)	mg/kg	10 : 40 : 49	1.09E-03	2.30E-03	No	ND	--	No	9.00E-03	No	No	<SGW
CBS-CSB	5103-74-2	gamma-Chlordane	mg/kg	2 : 2 : 49	3.90E-04	4.40E-04	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSB	76-44-8	Heptachlor	mg/kg	3 : 32 : 49	1.10E-03	1.20E-03	No	ND	--	No	2.30E+01	No	No	<SGW
CBS-CSB	1024-57-3	Heptachlor epoxide	mg/kg	14 : 49 : 49	1.43E-02	4.10E-01	No	ND	--	No	7.00E-01	No	No	<SGW
CBS-CSB	193-39-5	Indeno(1,2,3-cd)pyrene	mg/kg	4 : 49 : 49	1.39E-01	8.30E-01	No	ND	--	No	1.40E+01	No	No	<SGW
CBS-CSB	7439-89-6	Iron	mg/kg	49 : 49 : 49	1.38E+04	2.80E+04	Yes	4.13E+04	No	Yes	NA	No	No	EN
CBS-CSB	7439-92-1	Lead	mg/kg	49 : 49 : 49	7.46E+01	7.00E+02	No	4.38E+01	Yes	No	NA	No	No	NA
CBS-CSB	7439-95-4	Magnesium	mg/kg	49 : 49 : 49	3.72E+03	6.90E+03	Yes	1.03E+04	No	Yes	NA	No	No	EN
CBS-CSB	7439-96-5	Manganese	mg/kg	49 : 49 : 49	1.30E+02	5.30E+02	No	1.42E+03	No	Yes	NA	No	No	<BK
CBS-CSB	7085-19-0	MCPP	mg/kg	3 : 47 : 49	1.61E+00	6.10E+00	No	ND	--	No	NA	No	No	NA
CBS-CSB	7439-97-6	Mercury	mg/kg	48 : 49 : 49	1.34E-01	8.40E-01	No	9.60E-02	Yes	No	2.10E+00	No	No	<SGW
CBS-CSB	72-43-5	Methoxychlor	mg/kg	6 : 6 : 49	1.72E-03	6.60E-03	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSB	75-09-2	Methylene chloride	mg/kg	4 : 6 : 49	2.39E-03	2.90E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSB	7439-98-7	Molybdenum	mg/kg	27 : 49 : 49	7.79E-01	2.80E+00	No	8.90E-01	Yes	No	NA	No	No	NA
CBS-CSB	86-30-6	N-Nitrosodiphenylamine	mg/kg	4 : 49 : 49	1.37E-01	1.20E+00	No	ND	--	No	1.00E+00	Yes	Yes	>SGW

Table G-1 [illegible]
Tier 1 Class [illegible]oil-to-Groundwater TACO Screen
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSB	91-20-3	Naphthalene	mg/kg	5 : 49 : 49	2.61E-01	6.00E+00	No	ND	--	No	8.40E+01	No	No	<SGW
CBS-CSB	7440-02-0	Nickel	mg/kg	49 : 49 : 49	1.92E+02	6.30E+02	No	4.28E+01	Yes	No	1.30E+02	Yes	Yes	>SGW
CBS-CSB	98-95-3	Nitrobenzene	mg/kg	2 : 49 : 49	1.27E-01	5.20E-01	No	ND	--	No	1.00E-01	Yes	Yes	>SGW
CBS-CSB	87-86-5	Pentachlorophenol	mg/kg	37 : 49 : 49	9.87E-01	4.40E+01	No	NC	--	No	3.00E-02	Yes	Yes	>SGW
CBS-CSB	85-01-8	Phenanthrene	mg/kg	6 : 49 : 49	3.01E-01	7.00E+00	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSB	108-95-2	Phenol	mg/kg	3 : 49 : 49	1.85E-01	3.40E+00	No	ND	--	No	1.00E+02	No	No	<SGW
CBS-CSB	7440-09-7	Potassium	mg/kg	49 : 49 : 49	1.76E+03	3.20E+03	Yes	4.20E+03	No	Yes	NA	No	No	EN
CBS-CSB	129-00-0	Pyrene	mg/kg	5 : 49 : 49	2.42E-01	4.00E+00	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSB	7782-49-2	Selenium	mg/kg	2 : 49 : 49	8.09E-01	4.50E+00	No	ND	--	No	5.20E+00	No	No	<SGW
CBS-CSB	7440-22-4	Silver	mg/kg	10 : 49 : 49	7.78E-01	9.00E+00	No	ND	--	No	8.50E+00	Yes	Yes	>SGW
CBS-CSB	7440-23-5	Sodium	mg/kg	49 : 49 : 49	1.99E+02	6.70E+02	Yes	ND	--	Yes	NA	No	No	EN
CBS-CSB	100-42-5	Styrene	mg/kg	1 : 3 : 49	2.50E-03	2.80E-03	No	ND	--	No	4.00E+00	No	No	<SGW
CBS-CSB	127-18-4	Tetrachloroethene	mg/kg	3 : 48 : 49	5.27E-03	7.00E-02	No	ND	--	No	6.00E-02	Yes	Yes	>SGW
CBS-CSB	7440-28-0	Thallium	mg/kg	3 : 49 : 49	6.29E-01	1.30E+00	No	ND	--	No	2.80E+00	No	No	<SGW
CBS-CSB	7440-31-5	Tin	mg/kg	9 : 49 : 49	1.44E+01	4.70E+02	No	ND	--	No	NA	No	No	NA
CBS-CSB	108-88-3	Toluene	mg/kg	16 : 49 : 49	1.46E-02	2.90E-01	No	ND	--	No	1.20E+01	No	No	<SGW
CBS-CSB	1336-36-3	Total PCBs	mg/kg	38 : 49 : 49	2.78E+00	8.61E+01	No	ND	--	No	ND	No	No	<SGW
CBS-CSB	79-01-6	Trichloroethene	mg/kg	3 : 48 : 49	4.48E-03	3.40E-02	No	ND	--	No	6.00E-02	No	No	<SGW
CBS-CSB	7440-62-2	Vanadium	mg/kg	49 : 49 : 49	2.53E+01	4.70E+01	No	6.98E+01	No	Yes	9.80E+02	No	No	<SGW
CBS-CSB	1330-20-7	Xylenes (total)	mg/kg	13 : 49 : 49	7.64E-01	2.90E+01	No	ND	--	No	1.50E+02	No	No	<SGW
CBS-CSB	7440-66-6	Zinc	mg/kg	49 : 49 : 49	2.16E+03	1.05E+04	No	1.66E+02	Yes	No	6.20E+03	Yes	Yes	>SGW
CBS-CSC	1746-01-6	2,3,7,8-TCDD-TEQ	mg/kg	9 : 9 : 9	1.12E-05	3.66E-05	No	1.24E-05	Yes	No	NA	No	No	NA
CBS-CSC	78-93-3	2-Butanone (MEK)	mg/kg	3 : 3 : 9	7.60E-03	9.90E-03	No	4.99E-02	No	Yes	NA	No	No	<BK
CBS-CSC	67-64-1	Acetone	mg/kg	5 : 9 : 9	3.42E-02	8.30E-02	No	1.56E-01	No	Yes	1.60E+01	No	No	<SGW
CBS-CSC	5103-71-9	alpha-Chlordane	mg/kg	1 : 1 : 9	9.20E-04	9.20E-04	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSC	7429-90-5	Aluminum	mg/kg	9 : 9 : 9	1.08E+04	1.30E+04	No	2.90E+04	No	Yes	NA	No	No	<BK
CBS-CSC	7440-36-0	Antimony	mg/kg	1 : 1 : 9	7.90E-01	7.90E-01	No	2.75E+00	No	Yes	5.00E+00	No	No	<SGW
CBS-CSC	7440-38-2	Arsenic	mg/kg	9 : 9 : 9	9.70E+00	1.40E+01	No	1.44E+01	No	Yes	2.90E+01	No	No	<SGW
CBS-CSC	7440-39-3	Barium	mg/kg	9 : 9 : 9	2.49E+02	3.30E+02	No	4.13E+02	No	Yes	1.60E+03	No	No	<SGW
CBS-CSC	71-43-2	Benzene	mg/kg	1 : 1 : 9	3.00E-03	3.00E-03	No	ND	--	No	3.00E-02	No	No	<SGW
CBS-CSC	191-24-2	Benzo(g,h,i)perylene	mg/kg	1 : 1 : 9	6.50E-02	6.50E-02	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSC	7440-41-7	Beryllium	mg/kg	9 : 9 : 9	8.28E-01	9.60E-01	No	1.56E+00	No	Yes	6.30E+01	No	No	<SGW
CBS-CSC	7440-43-9	Cadmium	mg/kg	9 : 9 : 9	1.33E+01	2.40E+01	No	8.30E-01	Yes	No	7.50E+00	Yes	Yes	>SGW
CBS-CSC	7440-70-2	Calcium	mg/kg	9 : 9 : 9	7.81E+03	1.40E+04	Yes	2.70E+04	No	Yes	NA	No	No	EN
CBS-CSC	108-90-7	Chlorobenzene	mg/kg	9 : 9 : 9	1.30E-01	7.00E-01	No	ND	--	No	1.00E+00	No	No	<SGW
CBS-CSC	7440-47-3	Chromium	mg/kg	9 : 9 : 9	3.61E+01	1.10E+02	No	4.00E+01	Yes	No	3.80E+01	Yes	Yes	>SGW
CBS-CSC	7440-48-4	Cobalt	mg/kg	9 : 9 : 9	9.41E+00	1.40E+01	No	1.72E+01	No	Yes	NA	No	No	<BK
CBS-CSC	7440-50-8	Copper	mg/kg	9 : 9 : 9	1.09E+02	2.50E+02	No	3.80E+01	Yes	No	1.30E+05	No	No	<SGW
CBS-CSC	319-86-8	delta-BHC	mg/kg	3 : 6 : 9	6.65E-04	9.90E-04	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSC	1918-00-9	Dicamba	mg/kg	1 : 1 : 9	6.60E-03	6.60E-03	No	ND	--	No	NA	No	No	NA
CBS-CSC	120-36-5	Dichlorprop	mg/kg	1 : 1 : 9	6.20E-03	6.20E-03	No	ND	--	No	NA	No	No	NA
CBS-CSC	60-57-1	Dieldrin	mg/kg	8 : 9 : 9	4.76E-03	1.10E-02	No	ND	--	No	4.00E-03	Yes	Yes	>SGW
CBS-CSC	1031-07-8	Endosulfan sulfate	mg/kg	3 : 7 : 9	4.17E-03	7.00E-03	No	ND	--	No	1.80E+01	No	No	<SGW

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSC	53494-70-5	Endrin ketone	mg/kg	1 : 6 : 9	5.73E-03	1.00E-02	No	ND	--	No	1.00E+00	No	No	<SGW
CBS-CSC	5103-74-2	gamma-Chlordane	mg/kg	1 : 1 : 9	1.10E-03	1.10E-03	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSC	7439-89-6	Iron	mg/kg	9 : 9 : 9	1.76E+04	2.10E+04	Yes	4.13E+04	No	Yes	NA	No	No	EN
CBS-CSC	7439-92-1	Lead	mg/kg	9 : 9 : 9	4.32E+01	1.40E+02	No	4.38E+01	Yes	No	NA	No	No	NA
CBS-CSC	7439-95-4	Magnesium	mg/kg	9 : 9 : 9	4.43E+03	6.70E+03	Yes	1.03E+04	No	Yes	NA	No	No	EN
CBS-CSC	7439-96-5	Manganese	mg/kg	9 : 9 : 9	1.89E+02	3.90E+02	No	1.42E+03	No	Yes	NA	No	No	<BK
CBS-CSC	7439-97-6	Mercury	mg/kg	9 : 9 : 9	9.56E-02	3.10E-01	No	9.60E-02	Yes	No	2.10E+00	No	No	<SGW
CBS-CSC	72-43-5	Methoxychlor	mg/kg	3 : 3 : 9	4.15E-03	7.10E-03	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSC	75-09-2	Methylene chloride	mg/kg	4 : 9 : 9	3.47E-03	4.80E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSC	7440-02-0	Nickel	mg/kg	9 : 9 : 9	2.63E+02	5.70E+02	No	4.28E+01	Yes	No	1.30E+02	Yes	Yes	>SGW
CBS-CSC	87-86-5	Pentachlorophenol	mg/kg	7 : 9 : 9	6.06E-03	1.40E-02	No	NC	--	No	3.00E-02	No	No	<SGW
CBS-CSC	85-01-8	Phenanthrene	mg/kg	1 : 1 : 9	2.50E-02	2.50E-02	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSC	7440-09-7	Potassium	mg/kg	9 : 9 : 9	1.87E+03	2.30E+03	Yes	4.20E+03	No	Yes	NA	No	No	EN
CBS-CSC	7440-23-5	Sodium	mg/kg	9 : 9 : 9	1.24E+02	2.00E+02	Yes	ND	--	Yes	NA	No	No	EN
CBS-CSC	100-42-5	Styrene	mg/kg	1 : 1 : 9	2.70E-03	2.70E-03	No	ND	--	No	4.00E+00	No	No	<SGW
CBS-CSC	7440-31-5	Tin	mg/kg	1 : 9 : 9	3.93E+00	7.50E+00	No	ND	--	No	NA	No	No	NA
CBS-CSC	108-88-3	Toluene	mg/kg	4 : 9 : 9	4.13E-03	7.50E-03	No	ND	--	No	1.20E+01	No	No	<SGW
CBS-CSC	1336-36-3	Total PCBs	mg/kg	6 : 9 : 9	6.91E-02	1.78E-01	No	ND	--	No	ND	No	No	<SGW
CBS-CSC	7440-62-2	Vanadium	mg/kg	9 : 9 : 9	3.10E+01	3.70E+01	No	6.98E+01	No	Yes	9.80E+02	No	No	<SGW
CBS-CSC	1330-20-7	Xylenes (total)	mg/kg	1 : 9 : 9	3.74E-03	4.30E-03	No	ND	--	No	1.50E+02	No	No	<SGW
CBS-CSC	7440-66-6	Zinc	mg/kg	9 : 9 : 9	2.14E+03	3.40E+03	No	1.66E+02	Yes	No	6.20E+03	No	No	<SGW
CBS-CSD	106-46-7	1,4-Dichlorobenzene	mg/kg	2 : 6 : 6	1.12E-01	1.30E-01	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSD	1746-01-6	2,3,7,8-TCDD-TEQ	mg/kg	6 : 6 : 6	1.65E-04	8.86E-04	No	1.24E-05	Yes	No	NA	No	No	NA
CBS-CSD	93-76-5	2,4,5-T	mg/kg	1 : 1 : 6	5.40E-03	5.40E-03	No	ND	--	No	NA	No	No	NA
CBS-CSD	78-93-3	2-Butanone (MEK)	mg/kg	3 : 3 : 6	8.07E-03	1.00E-02	No	4.99E-02	No	Yes	NA	No	No	<BK
CBS-CSD	72-54-8	4,4'-DDD	mg/kg	1 : 1 : 6	1.40E-03	1.40E-03	No	ND	--	No	1.60E+01	No	No	<SGW
CBS-CSD	50-29-3	4,4'-DDT	mg/kg	1 : 6 : 6	5.62E-02	2.40E-01	No	ND	--	No	3.20E+01	No	No	<SGW
CBS-CSD	309-00-2	Aldrin	mg/kg	2 : 5 : 6	5.03E-03	9.00E-03	No	ND	--	No	5.00E-01	No	No	<SGW
CBS-CSD	5103-71-9	alpha-Chlordane	mg/kg	1 : 5 : 6	6.78E-03	1.20E-02	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSD	7429-90-5	Aluminum	mg/kg	6 : 6 : 6	1.09E+04	1.40E+04	No	2.90E+04	No	Yes	NA	No	No	<BK
CBS-CSD	7440-38-2	Arsenic	mg/kg	6 : 6 : 6	1.14E+01	1.80E+01	No	1.44E+01	Yes	No	2.90E+01	No	No	<SGW
CBS-CSD	7440-39-3	Barium	mg/kg	6 : 6 : 6	3.12E+02	5.70E+02	No	4.13E+02	Yes	No	1.60E+03	No	No	<SGW
CBS-CSD	50-32-8	Benzo(a)pyrene	mg/kg	3 : 6 : 6	8.48E-02	1.40E-01	No	ND	--	No	8.00E+00	No	No	<SGW
CBS-CSD	205-99-2	Benzo(b)fluoranthene	mg/kg	1 : 6 : 6	1.36E-01	2.00E-01	No	ND	--	No	5.00E+00	No	No	<SGW
CBS-CSD	191-24-2	Benzo(g,h,i)perylene	mg/kg	2 : 6 : 6	1.40E-01	2.20E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSD	207-08-9	Benzo(k)fluoranthene	mg/kg	1 : 6 : 6	1.38E-01	2.10E-01	No	ND	--	No	4.90E+01	No	No	<SGW
CBS-CSD	7440-41-7	Beryllium	mg/kg	6 : 6 : 6	8.38E-01	9.90E-01	No	1.56E+00	No	Yes	2.20E+01	No	No	<SGW
CBS-CSD	7440-43-9	Cadmium	mg/kg	6 : 6 : 6	1.98E+01	4.00E+01	No	8.30E-01	Yes	No	5.20E+00	Yes	Yes	>SGW
CBS-CSD	7440-70-2	Calcium	mg/kg	6 : 6 : 6	8.53E+03	2.50E+04	Yes	2.70E+04	No	Yes	NA	No	No	EN
CBS-CSD	108-90-7	Chlorobenzene	mg/kg	5 : 6 : 6	3.13E-02	1.50E-01	No	ND	--	No	1.00E+00	No	No	<SGW
CBS-CSD	7440-47-3	Chromium	mg/kg	6 : 6 : 6	4.93E+01	5.70E+01	No	4.00E+01	Yes	No	4.00E+01	Yes	Yes	>SGW
CBS-CSD	7440-48-4	Cobalt	mg/kg	6 : 6 : 6	9.47E+00	1.20E+01	No	1.72E+01	No	Yes	NA	No	No	<BK
CBS-CSD	7440-50-8	Copper	mg/kg	6 : 6 : 6	3.86E+02	1.60E+03	No	3.80E+01	Yes	No	5.90E+04	No	No	<SGW

Table G-1
Tier 1 Class I Soil-to-Groundwater TACO Screen
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSD	75-99-0	Dalapon	mg/kg	1 : 6 : 6	4.75E-02	5.00E-02	No	ND	--	No	8.50E-01	No	No	<SGW
CBS-CSD	319-86-8	delta-BHC	mg/kg	4 : 5 : 6	8.24E-04	1.90E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSD	1918-00-9	Dicamba	mg/kg	1 : 1 : 6	1.80E-03	1.80E-03	No	ND	--	No	NA	No	No	NA
CBS-CSD	120-36-5	Dichlorprop	mg/kg	1 : 1 : 6	2.10E-02	2.10E-02	No	ND	--	No	NA	No	No	NA
CBS-CSD	60-57-1	Dieldrin	mg/kg	5 : 6 : 6	1.27E-01	6.90E-01	No	ND	--	No	4.00E-03	Yes	Yes	>SGW
CBS-CSD	1031-07-8	Endosulfan sulfate	mg/kg	1 : 2 : 6	7.10E-03	9.50E-03	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSD	206-44-0	Fluoranthene	mg/kg	4 : 6 : 6	1.31E-01	1.90E-01	No	ND	--	No	4.30E+03	No	No	<SGW
CBS-CSD	5103-74-2	gamma-Chlordane	mg/kg	2 : 6 : 6	1.55E-02	6.70E-02	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSD	193-39-5	Indeno(1,2,3-cd)pyrene	mg/kg	2 : 6 : 6	1.30E-01	1.80E-01	No	ND	--	No	1.40E+01	No	No	<SGW
CBS-CSD	7439-89-6	Iron	mg/kg	6 : 6 : 6	1.72E+04	2.00E+04	Yes	4.13E+04	No	Yes	NA	No	No	EN
CBS-CSD	7439-92-1	Lead	mg/kg	6 : 6 : 6	9.82E+01	2.80E+02	No	4.38E+01	Yes	No	NA	No	No	NA
CBS-CSD	7439-95-4	Magnesium	mg/kg	6 : 6 : 6	3.77E+03	5.00E+03	Yes	1.03E+04	No	Yes	NA	No	No	EN
CBS-CSD	7439-96-5	Manganese	mg/kg	6 : 6 : 6	1.37E+02	1.90E+02	No	1.42E+03	No	Yes	NA	No	No	<BK
CBS-CSD	7439-97-6	Mercury	mg/kg	6 : 6 : 6	2.38E-01	7.10E-01	No	9.60E-02	Yes	No	8.90E-01	No	No	<SGW
CBS-CSD	72-43-5	Methoxychlor	mg/kg	3 : 4 : 6	2.47E-02	6.20E-02	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSD	75-09-2	Methylene chloride	mg/kg	4 : 4 : 6	2.68E-03	3.20E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSD	7439-98-7	Molybdenum	mg/kg	2 : 6 : 6	2.33E+00	7.00E+00	No	8.90E-01	Yes	No	NA	No	No	NA
CBS-CSD	7440-02-0	Nickel	mg/kg	6 : 6 : 6	2.87E+02	5.30E+02	No	4.28E+01	Yes	No	1.00E+02	Yes	Yes	>SGW
CBS-CSD	87-86-5	Pentachlorophenol	mg/kg	5 : 6 : 6	6.90E-03	1.30E-02	No	NC	--	No	4.00E-02	No	No	<SGW
CBS-CSD	85-01-8	Phenanthrene	mg/kg	2 : 4 : 6	1.01E-01	1.20E-01	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSD	7440-09-7	Potassium	mg/kg	6 : 6 : 6	1.80E+03	2.10E+03	Yes	4.20E+03	No	Yes	NA	No	No	EN
CBS-CSD	129-00-0	Pyrene	mg/kg	3 : 6 : 6	1.32E-01	1.60E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSD	7782-49-2	Selenium	mg/kg	1 : 5 : 6	1.27E+00	2.80E+00	No	ND	--	No	6.30E+00	No	No	<SGW
CBS-CSD	7440-22-4	Silver	mg/kg	1 : 6 : 6	8.25E-01	1.50E+00	No	ND	--	No	4.40E+00	No	No	<SGW
CBS-CSD	7440-23-5	Sodium	mg/kg	6 : 6 : 6	1.75E+02	3.30E+02	Yes	ND	--	Yes	NA	No	No	EN
CBS-CSD	7440-31-5	Tin	mg/kg	2 : 6 : 6	5.23E+00	1.10E+01	No	ND	--	No	NA	No	No	NA
CBS-CSD	108-88-3	Toluene	mg/kg	1 : 1 : 6	2.90E-03	2.90E-03	No	ND	--	No	1.20E+01	No	No	<SGW
CBS-CSD	1336-36-3	Total PCBs	mg/kg	5 : 6 : 6	4.92E-01	2.44E+00	No	ND	--	No	ND	No	No	<SGW
CBS-CSD	7440-62-2	Vanadium	mg/kg	6 : 6 : 6	3.15E+01	3.60E+01	No	6.98E+01	No	Yes	9.80E+02	No	No	<SGW
CBS-CSD	7440-66-6	Zinc	mg/kg	6 : 6 : 6	4.10E+03	8.20E+03	No	1.66E+02	Yes	No	5.10E+03	Yes	Yes	>SGW
CBS-CSE	106-46-7	1,4-Dichlorobenzene	mg/kg	1 : 17 : 17	1.30E-01	2.30E-01	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSE	1746-01-6	2,3,7,8-TCDD-TEQ	mg/kg	14 : 17 : 17	3.06E-05	1.05E-04	No	1.24E-05	Yes	No	NA	No	No	NA
CBS-CSE	94-75-7	2,4-D	mg/kg	2 : 17 : 17	8.34E-03	3.50E-02	No	2.03E-02	Yes	No	1.50E+00	No	No	<SGW
CBS-CSE	78-93-3	2-Butanone (MEK)	mg/kg	5 : 5 : 17	1.06E-02	1.40E-02	No	4.99E-02	No	Yes	NA	No	No	<BK
CBS-CSE	72-54-8	4,4'-DDD	mg/kg	2 : 17 : 17	6.19E-03	4.70E-02	No	ND	--	No	1.60E+01	No	No	<SGW
CBS-CSE	72-55-9	4,4'-DDE	mg/kg	6 : 15 : 17	2.06E-03	7.20E-03	No	ND	--	No	5.40E+01	No	No	<SGW
CBS-CSE	50-29-3	4,4'-DDT	mg/kg	7 : 17 : 17	4.53E-03	1.70E-02	No	ND	--	No	3.20E+01	No	No	<SGW
CBS-CSE	67-64-1	Acetone	mg/kg	9 : 17 : 17	3.78E-02	7.30E-02	No	1.56E-01	No	Yes	1.60E+01	No	No	<SGW
CBS-CSE	319-84-6	alpha-BHC	mg/kg	1 : 15 : 17	4.21E-04	1.30E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSE	5103-71-9	alpha-Chlordane	mg/kg	1 : 17 : 17	2.31E-03	8.70E-03	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSE	7429-90-5	Aluminum	mg/kg	17 : 17 : 17	9.97E+03	1.40E+04	No	2.90E+04	No	Yes	NA	No	No	<BK
CBS-CSE	120-12-7	Anthracene	mg/kg	1 : 1 : 17	5.00E-02	5.00E-02	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSE	7440-36-0	Antimony	mg/kg	3 : 17 : 17	1.43E+00	4.70E+00	No	2.75E+00	Yes	No	5.00E+00	No	No	<SGW

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSE	7440-38-2	Arsenic	mg/kg	16 : 17 : 17	8.08E+00	2.00E+01	No	1.44E+01	Yes	No	2.90E+01	No	No	<SGW
CBS-CSE	7440-39-3	Barium	mg/kg	17 : 17 : 17	2.52E+02	6.40E+02	No	4.13E+02	Yes	No	1.60E+03	No	No	<SGW
CBS-CSE	56-55-3	Benzo(a)anthracene	mg/kg	3 : 17 : 17	1.26E-01	2.60E-01	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSE	50-32-8	Benzo(a)pyrene	mg/kg	3 : 17 : 17	8.97E-02	4.20E-01	No	ND	--	No	8.00E+00	No	No	<SGW
CBS-CSE	205-99-2	Benzo(b)fluoranthene	mg/kg	4 : 17 : 17	1.41E-01	5.10E-01	No	ND	--	No	5.00E+00	No	No	<SGW
CBS-CSE	191-24-2	Benzo(g,h,i)perylene	mg/kg	3 : 17 : 17	1.35E-01	3.50E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSE	207-08-9	Benzo(k)fluoranthene	mg/kg	3 : 17 : 17	1.35E-01	3.70E-01	No	ND	--	No	4.90E+01	No	No	<SGW
CBS-CSE	7440-41-7	Beryllium	mg/kg	17 : 17 : 17	7.44E-01	1.10E+00	No	1.56E+00	No	Yes	6.30E+01	No	No	<SGW
CBS-CSE	117-81-7	Bis(2-ethylhexyl)phthalate	mg/kg	1 : 1 : 17	7.70E-02	7.70E-02	No	ND	--	No	3.60E+03	No	No	<SGW
CBS-CSE	7440-43-9	Cadmium	mg/kg	17 : 17 : 17	1.42E+01	3.80E+01	No	8.30E-01	Yes	No	7.50E+00	Yes	Yes	>SGW
CBS-CSE	7440-70-2	Calcium	mg/kg	17 : 17 : 17	8.02E+03	1.30E+04	Yes	2.70E+04	No	Yes	NA	No	No	EN
CBS-CSE	108-90-7	Chlorobenzene	mg/kg	12 : 17 : 17	2.33E-02	2.10E-01	No	ND	--	No	1.00E+00	No	No	<SGW
CBS-CSE	7440-47-3	Chromium	mg/kg	17 : 17 : 17	4.73E+01	1.70E+02	No	4.00E+01	Yes	No	3.80E+01	Yes	Yes	>SGW
CBS-CSE	218-01-9	Chrysene	mg/kg	4 : 17 : 17	1.32E-01	3.70E-01	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSE	7440-48-4	Cobalt	mg/kg	17 : 17 : 17	8.08E+00	1.30E+01	No	1.72E+01	No	Yes	NA	No	No	<BK
CBS-CSE	7440-50-8	Copper	mg/kg	17 : 17 : 17	4.25E+02	4.30E+03	No	3.80E+01	Yes	No	1.30E+05	No	No	<SGW
CBS-CSE	84-74-2	di-n-Butylphthalate	mg/kg	1 : 1 : 17	7.40E-02	7.40E-02	No	ND	--	No	2.30E+03	No	No	<SGW
CBS-CSE	53-70-3	Dibenzo(a,h)anthracene	mg/kg	1 : 17 : 17	6.93E-02	1.40E-01	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSE	1918-00-9	Dicamba	mg/kg	1 : 1 : 17	2.50E-03	2.50E-03	No	ND	--	No	NA	No	No	NA
CBS-CSE	60-57-1	Dieldrin	mg/kg	13 : 17 : 17	5.49E-03	3.40E-02	No	ND	--	No	4.00E-03	Yes	Yes	>SGW
CBS-CSE	959-98-8	Endosulfan I	mg/kg	3 : 3 : 17	1.43E-04	1.70E-04	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSE	33213-65-9	Endosulfan II	mg/kg	1 : 1 : 17	6.60E-04	6.60E-04	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSE	1031-07-8	Endosulfan sulfate	mg/kg	2 : 17 : 17	3.56E-03	1.60E-02	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSE	100-41-4	Ethylbenzene	mg/kg	1 : 17 : 17	3.64E-03	4.90E-03	No	ND	--	No	1.30E+01	No	No	<SGW
CBS-CSE	206-44-0	Fluoranthene	mg/kg	4 : 17 : 17	1.63E-01	7.10E-01	No	ND	--	No	4.30E+03	No	No	<SGW
CBS-CSE	5103-74-2	gamma-Chlordane	mg/kg	2 : 16 : 17	1.66E-03	5.50E-03	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSE	1024-57-3	Heptachlor epoxide	mg/kg	5 : 5 : 17	4.34E-04	5.90E-04	No	ND	--	No	7.00E-01	No	No	<SGW
CBS-CSE	193-39-5	Indeno(1,2,3-cd)pyrene	mg/kg	2 : 17 : 17	1.38E-01	3.50E-01	No	ND	--	No	1.40E+01	No	No	<SGW
CBS-CSE	7439-89-6	Iron	mg/kg	17 : 17 : 17	1.78E+04	2.70E+04	Yes	4.13E+04	No	Yes	NA	No	No	EN
CBS-CSE	7439-92-1	Lead	mg/kg	17 : 17 : 17	7.85E+01	4.00E+02	No	4.38E+01	Yes	No	NA	No	No	NA
CBS-CSE	7439-95-4	Magnesium	mg/kg	17 : 17 : 17	4.51E+03	6.90E+03	Yes	1.03E+04	No	Yes	NA	No	No	EN
CBS-CSE	7439-96-5	Manganese	mg/kg	17 : 17 : 17	1.73E+02	3.00E+02	No	1.42E+03	No	Yes	NA	No	No	<BK
CBS-CSE	7439-97-6	Mercury	mg/kg	17 : 17 : 17	4.06E-01	1.60E+00	No	9.60E-02	Yes	No	2.10E+00	No	No	<SGW
CBS-CSE	72-43-5	Methoxychlor	mg/kg	3 : 3 : 17	7.20E-04	8.90E-04	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSE	75-09-2	Methylene chloride	mg/kg	3 : 6 : 17	2.78E-03	3.25E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSE	7439-98-7	Molybdenum	mg/kg	2 : 17 : 17	3.84E-01	1.50E+00	No	8.90E-01	Yes	No	NA	No	No	NA
CBS-CSE	7440-02-0	Nickel	mg/kg	17 : 17 : 17	1.81E+02	6.00E+02	No	4.28E+01	Yes	No	1.30E+02	Yes	Yes	>SGW
CBS-CSE	87-86-5	Pentachlorophenol	mg/kg	7 : 17 : 17	1.13E-02	3.30E-02	No	NC	--	No	3.00E-02	Yes	Yes	>SGW
CBS-CSE	85-01-8	Phenanthrene	mg/kg	4 : 17 : 17	1.26E-01	2.90E-01	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSE	7440-09-7	Potassium	mg/kg	17 : 17 : 17	2.07E+03	2.90E+03	Yes	4.20E+03	No	Yes	NA	No	No	EN
CBS-CSE	129-00-0	Pyrene	mg/kg	3 : 17 : 17	1.48E-01	4.80E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSE	7440-22-4	Silver	mg/kg	3 : 17 : 17	1.20E+00	9.80E+00	No	ND	--	No	8.50E+00	Yes	Yes	>SGW
CBS-CSE	7440-23-5	Sodium	mg/kg	17 : 17 : 17	2.41E+02	3.90E+02	Yes	ND	--	Yes	NA	No	No	EN

Table G-1
Tier 1 Class I Soil-to-Groundwater TACO Screen
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSE	7440-28-0	Thallium	mg/kg	1 : 16 : 17	6.61E-01	8.80E-01	No	ND	--	No	2.80E+00	No	No	<SGW
CBS-CSE	7440-31-5	Tin	mg/kg	3 : 17 : 17	5.60E+00	3.10E+01	No	ND	--	No	NA	No	No	NA
CBS-CSE	108-88-3	Toluene	mg/kg	3 : 17 : 17	3.70E-03	4.45E-03	No	ND	--	No	1.20E+01	No	No	<SGW
CBS-CSE	1336-36-3	Total PCBs	mg/kg	10 : 17 : 17	1.87E-01	1.25E+00	No	ND	--	No	ND	No	No	<SGW
CBS-CSE	7440-62-2	Vanadium	mg/kg	17 : 17 : 17	2.95E+01	3.90E+01	No	6.98E+01	No	Yes	9.80E+02	No	No	<SGW
CBS-CSE	7440-66-6	Zinc	mg/kg	17 : 17 : 17	1.92E+03	5.90E+03	No	1.66E+02	Yes	No	6.20E+03	No	No	<SGW
CBS-CSF	79-34-5	1,1,2,2-Tetrachloroethane	mg/kg	1 : 16 : 16	3.91E-03	1.00E-02	No	ND	--	No	3.00E-03	Yes	Yes	>SGW
CBS-CSF	79-00-5	1,1,2-Trichloroethane	mg/kg	1 : 16 : 16	3.67E-03	6.10E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSF	107-06-2	1,2-Dichloroethane	mg/kg	1 : 1 : 16	2.10E-03	2.10E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSF	106-46-7	1,4-Dichlorobenzene	mg/kg	1 : 1 : 16	9.40E-02	9.40E-02	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSF	1746-01-6	2,3,7,8-TCDD-TEQ	mg/kg	16 : 16 : 16	8.91E-05	7.69E-04	No	1.24E-05	Yes	No	NA	No	No	NA
CBS-CSF	94-75-7	2,4-D	mg/kg	3 : 16 : 16	7.00E-03	2.63E-02	No	2.03E-02	Yes	No	1.50E+00	No	No	<SGW
CBS-CSF	78-93-3	2-Butanone (MEK)	mg/kg	7 : 8 : 16	1.03E-02	1.40E-02	No	4.99E-02	No	Yes	NA	No	No	<BK
CBS-CSF	72-55-9	4,4'-DDE	mg/kg	4 : 4 : 15	1.01E-03	1.60E-03	No	ND	--	No	5.40E+01	No	No	<SGW
CBS-CSF	50-29-3	4,4'-DDT	mg/kg	3 : 15 : 15	3.42E-03	7.50E-03	No	ND	--	No	3.20E+01	No	No	<SGW
CBS-CSF	67-64-1	Acetone	mg/kg	7 : 16 : 16	4.22E-02	6.40E-02	No	1.56E-01	No	Yes	1.60E+01	No	No	<SGW
CBS-CSF	309-00-2	Aldrin	mg/kg	1 : 1 : 16	2.30E-04	2.30E-04	No	ND	--	No	5.00E-01	No	No	<SGW
CBS-CSF	5103-71-9	alpha-Chlordane	mg/kg	2 : 15 : 16	1.97E-03	4.10E-03	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSF	7429-90-5	Aluminum	mg/kg	16 : 16 : 16	8.86E+03	1.20E+04	No	2.90E+04	No	Yes	NA	No	No	<BK
CBS-CSF	7440-36-0	Antimony	mg/kg	2 : 3 : 16	6.27E-01	6.60E-01	No	2.75E+00	No	Yes	5.00E+00	No	No	<SGW
CBS-CSF	7440-38-2	Arsenic	mg/kg	15 : 16 : 16	9.71E+00	1.90E+01	No	1.44E+01	Yes	No	2.90E+01	No	No	<SGW
CBS-CSF	7440-39-3	Barium	mg/kg	16 : 16 : 16	2.19E+02	3.30E+02	No	4.13E+02	No	Yes	1.70E+03	No	No	<SGW
CBS-CSF	56-55-3	Benzo(a)anthracene	mg/kg	4 : 4 : 16	6.23E-02	9.20E-02	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSF	50-32-8	Benzo(a)pyrene	mg/kg	5 : 16 : 16	6.95E-02	1.90E-01	No	ND	--	No	8.00E+00	No	No	<SGW
CBS-CSF	205-99-2	Benzo(b)fluoranthene	mg/kg	5 : 16 : 16	1.14E-01	1.80E-01	No	ND	--	No	5.00E+00	No	No	<SGW
CBS-CSF	191-24-2	Benzo(g,h,i)perylene	mg/kg	5 : 15 : 16	1.07E-01	1.30E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSF	207-08-9	Benzo(k)fluoranthene	mg/kg	4 : 15 : 16	1.10E-01	1.30E-01	No	ND	--	No	4.90E+01	No	No	<SGW
CBS-CSF	7440-41-7	Beryllium	mg/kg	13 : 16 : 16	6.10E-01	8.90E-01	No	1.56E+00	No	Yes	1.40E+02	No	No	<SGW
CBS-CSF	319-85-7	beta-BHC	mg/kg	1 : 16 : 16	8.21E-04	3.90E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
CBS-CSF	117-81-7	Bis(2-ethylhexyl)phthalate	mg/kg	4 : 6 : 16	9.06E-02	1.10E-01	No	ND	--	No	3.60E+03	No	No	<SGW
CBS-CSF	75-27-4	Bromodichloromethane	mg/kg	1 : 1 : 16	1.30E-03	1.30E-03	No	ND	--	No	6.00E-01	No	No	<SGW
CBS-CSF	75-25-2	Bromoform	mg/kg	1 : 2 : 16	2.95E-03	3.00E-03	No	ND	--	No	8.00E-01	No	No	<SGW
CBS-CSF	7440-43-9	Cadmium	mg/kg	15 : 16 : 16	2.03E+01	5.70E+01	No	8.30E-01	Yes	No	1.10E+01	Yes	Yes	>SGW
CBS-CSF	7440-70-2	Calcium	mg/kg	16 : 16 : 16	9.80E+03	1.70E+04	Yes	2.70E+04	No	Yes	NA	No	No	EN
CBS-CSF	108-90-7	Chlorobenzene	mg/kg	3 : 16 : 16	4.41E-03	1.40E-02	No	ND	--	No	1.00E+00	No	No	<SGW
CBS-CSF	7440-47-3	Chromium	mg/kg	16 : 16 : 16	1.68E+01	2.90E+01	No	4.00E+01	No	Yes	3.60E+01	No	No	<SGW
CBS-CSF	218-01-9	Chrysene	mg/kg	5 : 16 : 16	1.08E-01	1.40E-01	No	ND	--	No	1.60E+02	No	No	<SGW
CBS-CSF	7440-48-4	Cobalt	mg/kg	16 : 16 : 16	8.84E+00	1.30E+01	No	1.72E+01	No	Yes	NA	No	No	<BK
CBS-CSF	7440-50-8	Copper	mg/kg	16 : 16 : 16	1.20E+02	5.05E+02	No	3.80E+01	Yes	No	2.00E+05	No	No	<SGW
CBS-CSF	57-12-5	Cyanide	mg/kg	2 : 16 : 16	6.56E-01	4.57E+00	No	ND	--	No	4.00E+01	No	No	<SGW
CBS-CSF	124-48-1	Dibromochloromethane	mg/kg	1 : 1 : 16	2.00E-03	2.00E-03	No	ND	--	No	4.00E-01	No	No	<SGW
CBS-CSF	1918-00-9	Dicamba	mg/kg	4 : 4 : 16	4.09E-03	6.25E-03	No	ND	--	No	NA	No	No	NA
CBS-CSF	60-57-1	Dieldrin	mg/kg	9 : 16 : 16	2.30E-03	8.20E-03	No	ND	--	No	4.00E-03	Yes	Yes	>SGW

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
CBS-CSF	1031-07-8	Endosulfan sulfate	mg/kg	1 : 10 : 16	2.73E-03	4.30E-03	No	ND	--	No	1.80E+01	No	No	<SGW
CBS-CSF	206-44-0	Fluoranthene	mg/kg	5 : 16 : 16	1.12E-01	1.70E-01	No	ND	--	No	4.30E+03	No	No	<SGW
CBS-CSF	5103-74-2	gamma-Chlordane	mg/kg	6 : 16 : 16	1.52E-03	3.80E-03	No	ND	--	No	1.00E+01	No	No	<SGW
CBS-CSF	87-68-3	Hexachlorobutadiene	mg/kg	1 : 1 : 16	6.10E-02	6.10E-02	No	ND	--	No	2.00E+00	No	No	<SGW
CBS-CSF	193-39-5	Indeno(1,2,3-cd)pyrene	mg/kg	2 : 5 : 16	1.06E-01	1.10E-01	No	ND	--	No	1.40E+01	No	No	<SGW
CBS-CSF	7439-89-6	Iron	mg/kg	16 : 16 : 16	1.93E+04	4.10E+04	Yes	4.13E+04	No	Yes	NA	No	No	EN
CBS-CSF	7439-92-1	Lead	mg/kg	16 : 16 : 16	5.81E+01	4.50E+02	No	4.38E+01	Yes	No	NA	No	No	NA
CBS-CSF	7439-95-4	Magnesium	mg/kg	16 : 16 : 16	5.27E+03	8.20E+03	Yes	1.03E+04	No	Yes	NA	No	No	EN
CBS-CSF	7439-96-5	Manganese	mg/kg	16 : 16 : 16	3.35E+02	8.90E+02	No	1.42E+03	No	Yes	NA	No	No	<BK
CBS-CSF	7085-19-0	MCPP	mg/kg	1 : 16 : 16	1.46E+00	2.30E+00	No	ND	--	No	NA	No	No	NA
CBS-CSF	7439-97-6	Mercury	mg/kg	16 : 16 : 16	1.91E-01	8.20E-01	No	9.60E-02	Yes	No	3.30E+00	No	No	<SGW
CBS-CSF	75-09-2	Methylene chloride	mg/kg	4 : 15 : 16	3.26E-03	4.30E-03	No	ND	--	No	2.00E-02	No	No	<SGW
CBS-CSF	7439-98-7	Molybdenum	mg/kg	2 : 16 : 16	5.90E-01	2.20E+00	No	8.90E-01	Yes	No	NA	No	No	NA
CBS-CSF	7440-02-0	Nickel	mg/kg	16 : 16 : 16	1.67E+02	6.30E+02	No	4.28E+01	Yes	No	1.80E+02	Yes	Yes	>SGW
CBS-CSF	87-86-5	Pentachlorophenol	mg/kg	8 : 16 : 16	9.11E-03	2.40E-02	No	NC	--	No	2.00E-02	Yes	Yes	>SGW
CBS-CSF	85-01-8	Phenanthrene	mg/kg	4 : 4 : 16	5.93E-02	9.80E-02	No	ND	--	No	1.20E+04	No	No	<SGW
CBS-CSF	7440-09-7	Potassium	mg/kg	16 : 16 : 16	1.59E+03	2.30E+03	Yes	4.20E+03	No	Yes	NA	No	No	EN
CBS-CSF	129-00-0	Pyrene	mg/kg	2 : 16 : 16	1.21E-01	1.60E-01	No	ND	--	No	4.20E+03	No	No	<SGW
CBS-CSF	7782-49-2	Selenium	mg/kg	1 : 15 : 16	6.89E-01	1.80E+00	No	ND	--	No	4.50E+00	No	No	<SGW
CBS-CSF	7440-22-4	Silver	mg/kg	1 : 16 : 16	6.65E-01	7.90E-01	No	ND	--	No	1.30E+01	No	No	<SGW
CBS-CSF	7440-23-5	Sodium	mg/kg	15 : 16 : 16	1.38E+02	2.90E+02	Yes	ND	--	Yes	NA	No	No	EN
CBS-CSF	7440-31-5	Tin	mg/kg	1 : 16 : 16	3.77E+00	1.70E+01	No	ND	--	No	NA	No	No	NA
CBS-CSF	108-88-3	Toluene	mg/kg	8 : 16 : 16	4.31E-03	7.70E-03	No	ND	--	No	1.20E+01	No	No	<SGW
CBS-CSF	1336-36-3	Total PCBs	mg/kg	7 : 16 : 16	6.75E-02	3.57E-01	No	ND	--	No	ND	No	No	<SGW
CBS-CSF	7440-62-2	Vanadium	mg/kg	16 : 16 : 16	2.57E+01	3.40E+01	No	6.98E+01	No	Yes	9.80E+02	No	No	<SGW
CBS-CSF	1330-20-7	Xylenes (total)	mg/kg	1 : 15 : 16	3.39E-03	4.05E-03	No	ND	--	No	1.50E+02	No	No	<SGW
CBS-CSF	7440-66-6	Zinc	mg/kg	16 : 16 : 16	2.24E+03	1.50E+04	No	1.66E+02	Yes	No	7.50E+03	Yes	Yes	>SGW
SITE M	120-82-1	1,2,4-Trichlorobenzene	mg/kg	2 : 5 : 9	1.04E-01	1.60E-01	No	ND	--	No	5.00E+00	No	No	<SGW
SITE M	95-50-1	1,2-Dichlorobenzene	mg/kg	1 : 5 : 9	1.29E-01	2.10E-01	No	ND	--	No	1.70E+01	No	No	<SGW
SITE M	106-46-7	1,4-Dichlorobenzene	mg/kg	3 : 9 : 9	9.78E-01	4.10E+00	No	ND	--	No	2.00E+00	Yes	Yes	>SGW
SITE M	1746-01-6	2,3,7,8-TCDD-TEQ	mg/kg	9 : 9 : 9	9.59E-04	5.23E-03	No	1.24E-05	Yes	No	NA	No	No	NA
SITE M	93-76-5	2,4,5-T	mg/kg	1 : 1 : 9	1.80E-03	1.80E-03	No	ND	--	No	NA	No	No	NA
SITE M	94-82-6	2,4-DB	mg/kg	2 : 9 : 9	1.72E-02	5.20E-02	No	ND	--	No	NA	No	No	NA
SITE M	78-93-3	2-Butanone (MEK)	mg/kg	9 : 9 : 9	5.01E-02	1.00E-01	No	4.99E-02	Yes	No	NA	No	No	NA
SITE M	72-55-9	4,4'-DDE	mg/kg	1 : 7 : 9	1.67E-02	3.50E-02	No	ND	--	No	5.40E+01	No	No	<SGW
SITE M	50-29-3	4,4'-DDT	mg/kg	5 : 9 : 9	2.17E-01	1.30E+00	No	ND	--	No	3.20E+01	No	No	<SGW
SITE M	106-47-8	4-Chloroaniline	mg/kg	1 : 1 : 9	1.00E-01	1.00E-01	No	ND	--	No	7.00E-01	No	No	<SGW
SITE M	83-32-9	Acenaphthene	mg/kg	2 : 2 : 9	6.25E-02	8.60E-02	No	ND	--	No	5.70E+02	No	No	<SGW
SITE M	67-64-1	Acetone	mg/kg	8 : 9 : 9	2.07E-01	5.65E-01	No	1.56E-01	Yes	No	1.60E+01	No	No	<SGW
SITE M	319-84-6	alpha-BHC	mg/kg	1 : 5 : 9	1.48E-03	2.30E-03	No	ND	--	No	5.00E-04	Yes	Yes	>SGW
SITE M	7429-90-5	Aluminum	mg/kg	9 : 9 : 9	3.87E+03	7.50E+03	No	2.90E+04	No	Yes	NA	No	No	<BK
SITE M	120-12-7	Anthracene	mg/kg	2 : 6 : 9	1.24E-01	2.30E-01	No	ND	--	No	1.20E+04	No	No	<SGW
SITE M	7440-36-0	Antimony	mg/kg	5 : 9 : 9	2.91E+00	6.80E+00	No	2.75E+00	Yes	No	5.00E+00	Yes	Yes	>SGW

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
SITE M	7440-38-2	Arsenic	mg/kg	9 : 9 : 9	7.28E+00	2.50E+01	No	1.44E+01	Yes	No	3.00E+01	No	No	<SGW
SITE M	7440-39-3	Barium	mg/kg	9 : 9 : 9	4.51E+02	1.80E+03	No	4.13E+02	Yes	No	1.80E+03	No	No	<SGW
SITE M	71-43-2	Benzene	mg/kg	4 : 9 : 9	8.35E-03	3.70E-02	No	ND	--	No	3.00E-02	Yes	Yes	>SGW
SITE M	56-55-3	Benzo(a)anthracene	mg/kg	8 : 9 : 9	2.54E-01	7.20E-01	No	ND	--	No	2.00E+00	No	No	<SGW
SITE M	50-32-8	Benzo(a)pyrene	mg/kg	5 : 8 : 9	2.14E-01	4.80E-01	No	ND	--	No	8.00E+00	No	No	<SGW
SITE M	205-99-2	Benzo(b)fluoranthene	mg/kg	5 : 7 : 9	2.37E-01	6.10E-01	No	ND	--	No	5.00E+00	No	No	<SGW
SITE M	191-24-2	Benzo(g,h,i)perylene	mg/kg	5 : 6 : 9	1.69E-01	4.10E-01	No	ND	--	No	4.20E+03	No	No	<SGW
SITE M	207-08-9	Benzo(k)fluoranthene	mg/kg	4 : 6 : 9	1.29E-01	3.40E-01	No	ND	--	No	4.90E+01	No	No	<SGW
SITE M	7440-41-7	Beryllium	mg/kg	9 : 9 : 9	2.94E-01	5.50E-01	No	1.56E+00	No	Yes	1.00E+03	No	No	<SGW
SITE M	117-81-7	Bis(2-ethylhexyl)phthalate	mg/kg	4 : 9 : 9	4.78E-01	1.13E+00	No	ND	--	No	3.60E+03	No	No	<SGW
SITE M	7440-43-9	Cadmium	mg/kg	9 : 9 : 9	4.92E+00	1.70E+01	No	8.30E-01	Yes	No	5.90E+01	No	No	<SGW
SITE M	7440-70-2	Calcium	mg/kg	9 : 9 : 9	7.54E+03	1.60E+04	Yes	2.70E+04	No	Yes	NA	No	No	EN
SITE M	86-74-8	Carbazole	mg/kg	1 : 1 : 9	3.20E-02	3.20E-02	No	ND	--	No	6.00E-01	No	No	<SGW
SITE M	75-15-0	Carbon disulfide	mg/kg	8 : 9 : 9	2.34E-02	7.95E-02	No	ND	--	No	3.20E+01	No	No	<SGW
SITE M	108-90-7	Chlorobenzene	mg/kg	8 : 9 : 9	3.38E-01	1.20E+00	No	ND	--	No	1.00E+00	Yes	Yes	>SGW
SITE M	7440-47-3	Chromium	mg/kg	9 : 9 : 9	1.85E+01	5.50E+01	No	4.00E+01	Yes	No	3.20E+01	Yes	Yes	>SGW
SITE M	218-01-9	Chrysene	mg/kg	8 : 9 : 9	2.99E-01	8.15E-01	No	ND	--	No	1.60E+02	No	No	<SGW
SITE M	7440-48-4	Cobalt	mg/kg	9 : 9 : 9	8.24E+00	2.35E+01	No	1.72E+01	Yes	No	NA	No	No	NA
SITE M	7440-50-8	Copper	mg/kg	9 : 9 : 9	1.44E+03	4.90E+03	No	3.80E+01	Yes	No	3.30E+05	No	No	<SGW
SITE M	57-12-5	Cyanide	mg/kg	2 : 9 : 9	6.96E-01	9.90E-01	No	ND	--	No	4.00E+01	No	No	<SGW
SITE M	53-70-3	Dibenzo(a,h)anthracene	mg/kg	2 : 5 : 9	8.06E-02	1.50E-01	No	ND	--	No	2.00E+00	No	No	<SGW
SITE M	132-64-9	Dibenzofuran	mg/kg	1 : 1 : 9	7.70E-02	7.70E-02	No	ND	--	No	NA	No	No	NA
SITE M	1918-00-9	Dicamba	mg/kg	2 : 2 : 9	2.95E-03	3.30E-03	No	ND	--	No	NA	No	No	NA
SITE M	120-36-5	Dichlorprop	mg/kg	1 : 1 : 9	2.40E-02	2.40E-02	No	ND	--	No	NA	No	No	NA
SITE M	7421-93-4	Endrin aldehyde	mg/kg	6 : 9 : 9	1.16E-01	8.30E-01	No	ND	--	No	1.00E+00	No	No	<SGW
SITE M	100-41-4	Ethylbenzene	mg/kg	4 : 9 : 9	4.93E-03	1.10E-02	No	ND	--	No	1.30E+01	No	No	<SGW
SITE M	206-44-0	Fluoranthene	mg/kg	8 : 9 : 9	5.08E-01	1.70E+00	No	ND	--	No	4.30E+03	No	No	<SGW
SITE M	86-73-7	Fluorene	mg/kg	3 : 6 : 9	1.73E-01	4.90E-01	No	ND	--	No	5.60E+02	No	No	<SGW
SITE M	58-89-9	gamma-BHC (Lindane)	mg/kg	4 : 4 : 9	2.85E-03	4.40E-03	No	ND	--	No	9.00E-03	No	No	<SGW
SITE M	76-44-8	Heptachlor	mg/kg	2 : 9 : 9	2.66E-02	1.60E-01	No	ND	--	No	2.30E+01	No	No	<SGW
SITE M	1024-57-3	Heptachlor epoxide	mg/kg	3 : 9 : 9	1.08E-01	8.60E-01	No	ND	--	No	7.00E-01	Yes	Yes	>SGW
SITE M	193-39-5	Indeno(1,2,3-cd)pyrene	mg/kg	2 : 5 : 9	1.17E-01	1.70E-01	No	ND	--	No	1.40E+01	No	No	<SGW
SITE M	7439-89-6	Iron	mg/kg	9 : 9 : 9	1.05E+04	1.80E+04	Yes	4.13E+04	No	Yes	NA	No	No	EN
SITE M	7439-92-1	Lead	mg/kg	9 : 9 : 9	9.23E+01	2.70E+02	No	4.38E+01	Yes	No	NA	No	No	NA
SITE M	7439-95-4	Magnesium	mg/kg	9 : 9 : 9	3.28E+03	6.50E+03	Yes	1.03E+04	No	Yes	NA	No	No	EN
SITE M	7439-96-5	Manganese	mg/kg	9 : 9 : 9	1.22E+02	3.60E+02	No	1.42E+03	No	Yes	NA	No	No	<BK
SITE M	7085-19-0	MCPP	mg/kg	1 : 9 : 9	2.04E+00	7.80E+00	No	ND	--	No	NA	No	No	NA
SITE M	7439-97-6	Mercury	mg/kg	9 : 9 : 9	1.26E-01	3.00E-01	No	9.60E-02	Yes	No	6.40E+00	No	No	<SGW
SITE M	7439-98-7	Molybdenum	mg/kg	3 : 9 : 9	6.96E-01	3.15E+00	No	8.90E-01	Yes	No	NA	No	No	NA
SITE M	86-30-6	N-Nitrosodiphenylamine	mg/kg	1 : 6 : 9	1.91E-01	6.00E-01	No	ND	--	No	1.00E+00	No	No	<SGW
SITE M	91-20-3	Naphthalene	mg/kg	2 : 5 : 9	1.07E-01	1.60E-01	No	ND	--	No	8.40E+01	No	No	<SGW
SITE M	7440-02-0	Nickel	mg/kg	9 : 9 : 9	4.80E+02	1.50E+03	No	4.28E+01	Yes	No	7.00E+02	Yes	Yes	>SGW
SITE M	87-86-5	Pentachlorophenol	mg/kg	9 : 9 : 9	6.37E-02	2.90E-01	No	NC	--	No	2.00E-02	Yes	Yes	>SGW

Table G-1
Tier 1 Class I Soil-to-Groundwater TACO Screen
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Class I screen - Using pH specific values for inorganics and ionizable organics.

Area	CAS #	Constituent	Units	Frequency of Detection	Average (Avg)	Maximum Detected Concentration (Max)	Essential Nutrient (EN)?	Sediment Background (BK) Concentration	Is Max>BK?	Pass EN/BK?	Class I TACO Tier I Soil-to-groundwater (SGW) Concentration	Is Max>SGW?	COPC?	Reason
SITE M	85-01-8	Phenanthrene	mg/kg	7 : 9 : 9	4.16E-01	1.40E+00	No	ND	--	No	1.20E+04	No	No	<SGW
SITE M	7440-09-7	Potassium	mg/kg	9 : 9 : 9	8.13E+02	1.50E+03	Yes	4.20E+03	No	Yes	NA	No	No	EN
SITE M	129-00-0	Pyrene	mg/kg	3 : 9 : 9	6.36E-01	1.70E+00	No	ND	--	No	4.20E+03	No	No	<SGW
SITE M	7440-22-4	Silver	mg/kg	7 : 9 : 9	1.67E+00	5.60E+00	No	ND	--	No	3.90E+01	No	No	<SGW
SITE M	7440-23-5	Sodium	mg/kg	8 : 9 : 9	1.22E+02	2.60E+02	Yes	ND	--	Yes	NA	No	No	EN
SITE M	7440-31-5	Tin	mg/kg	4 : 9 : 9	7.33E+00	2.00E+01	No	ND	--	No	NA	No	No	NA
SITE M	108-88-3	Toluene	mg/kg	8 : 9 : 9	1.01E-02	4.20E-02	No	ND	--	No	1.20E+01	No	No	<SGW
SITE M	1336-36-3	Total PCBs	mg/kg	9 : 9 : 9	5.40E+00	2.71E+01	No	ND	--	No	ND	No	No	<SGW
SITE M	7440-62-2	Vanadium	mg/kg	9 : 9 : 9	1.32E+01	2.30E+01	No	6.98E+01	No	Yes	9.80E+02	No	No	<SGW
SITE M	1330-20-7	Xylenes (total)	mg/kg	5 : 9 : 9	4.40E-02	1.60E-01	No	ND	--	No	1.50E+02	No	No	<SGW
SITE M	7440-66-6	Zinc	mg/kg	9 : 9 : 9	3.09E+03	1.20E+04	No	1.66E+02	Yes	No	1.60E+04	No	No	<SGW

Table G-2
Summary of TACO Tier 1 Class I RO Exceedances
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessement

Creek Segment	Constituents
CS-B	1,2,4-Trichlorobenzene, 1,2-Dichlorobenzene, 1,4-Dichlorobenzene, 2,4,6-Trichlorophenol, 2,4-Dichlorophenol, 4-Chloroaniline, alpha-BHC, Arsenic, Benzene, beta-BHC, Cadmium, Carbazole, Chlorobenzene, Chromium, delta-BHC, Dieldrin, N-Nitrosodiphenylamine, Nickel, Nitrobenzene, Pentachlorophenol, Silver, Tetrachloroethene, Zinc
CS-C	Cadmium, Chromium, delta-BHC, Dieldrin, Nickel
CS-D	Cadmium, Chromium, delta-BHC, Dieldrin, Nickel, Zinc
CS-E	alpha-BHC, Cadmium, Chromium, Dieldrin, Nickel, Pentachlorophenol, Silver
CS-F	1,1,2,2-Tetrachloroethane, beta-BHC, Cadmium, Dieldrin, Nickel, Pentachlorophenol, Zinc
Site M	1,4-Dichlorobenzene, alpha-BHC, Antimony, Benzene, Chlorobenzene, Chromium, Heptachlor epoxide, Nickel, Pentachlorophenol

RO - Remediation Objective
SGW - Soil-to-Groundwater
TACO - Tiered Approach to Corrective Action Objectives

Constituent	Units	FOD	Maximum Detected Concentration (Max)	Exposure Point Concentration (EPC)	Average (Avg)	TACO Tier 1 Class I Soil-to-groundwater (SGW) RO	Is Max>Tier 1 SGW?	Is EPC>Tier 1 SGW?	Is Avg>Tier 1 SGW?	TACO Tier 2 Class I Soil-to-groundwater (SGW) RO	Is Max>Tier 2 SGW?	Is Avg>Tier 2 SGW?
CS-B												
1,2,4-Trichlorobenzene	mg/kg	6 : 49 : 49	8.00E+01	4.90E-01	2.28E+00	5.00E+00	Yes	Yes	No			
1,2-Dichlorobenzene	mg/kg	6 : 49 : 49	5.30E+01	4.80E-01	1.67E+00	1.70E+01	Yes	Yes	No			
1,4-Dichlorobenzene	mg/kg	7 : 49 : 49	5.50E+00	2.70E-01	2.93E-01	2.00E+00	Yes	Yes	No			
2,4,6-Trichlorophenol	mg/kg	5 : 49 : 49	4.30E+00	1.15E-01	2.42E-04	1.50E-01	Yes	Yes	No			
2,4-Dichlorophenol	mg/kg	5 : 49 : 49	6.60E+00	2.07E-01	2.69E-01	1.00E+00	Yes	Yes	No			
4-Chloroaniline	mg/kg	5 : 49 : 49	1.10E+01	5.14E-01	5.94E-01	7.00E-01	Yes	Yes	No			
alpha-BHC	mg/kg	9 : 44 : 49	2.90E-03	7.00E-04	5.85E-04	5.00E-04	Yes	Yes	Yes	1.92E-03	Yes	No
Arsenic	mg/kg	49 : 49 : 49	4.40E+01	1.14E+01	9.72E+00	2.90E+01	Yes	Yes	No			
Benzene	mg/kg	19 : 49 : 49	1.80E-01	6.80E-03	8.31E-03	3.00E-02	Yes	Yes	No			
beta-BHC	mg/kg	10 : 46 : 49	7.70E-03	1.50E-03	1.25E-03	5.00E-04	Yes	Yes	Yes	1.92E-03	Yes	No
Cadmium	mg/kg	46 : 49 : 49	5.40E+01	2.60E+01	8.25E+00	7.50E+00	Yes	Yes	Yes	3.74E+00	Yes	Yes
Carbazole	mg/kg	1 : 49 : 49	6.20E-01	1.33E-01	1.28E-01	6.00E-01	Yes	Yes	No			
Chlorobenzene	mg/kg	38 : 49 : 49	9.70E+00	1.39E+00	4.50E-01	1.00E+00	Yes	Yes	No			
Chromium	mg/kg	49 : 49 : 49	1.80E+02	9.03E+01	5.13E+01	3.80E+01	Yes	Yes	Yes	9.16E+02	No	No
delta-BHC	mg/kg	2 : 44 : 49	4.10E-03	6.00E-03	5.27E-04	5.00E-04	Yes	Yes	Yes	1.59E-03	Yes	No
Dieldrin	mg/kg	8 : 47 : 49	4.90E-02	8.90E-03	7.72E-03	4.00E-03	Yes	Yes	Yes	7.01E-03	Yes	Yes
N-Nitrosodiphenylamine	mg/kg	4 : 49 : 49	1.20E+00	1.41E-01	1.37E-01	1.00E+00	Yes	Yes	No			
Nickel	mg/kg	49 : 49 : 49	6.30E+02	2.28E+02	1.92E+02	1.30E+02	Yes	Yes	Yes	4.47E+02	Yes	No
Nitrobenzene	mg/kg	2 : 49 : 49	5.20E-01	1.32E-01	1.27E-01	1.00E-01	Yes	Yes	Yes	7.48E-03	Yes	Yes
Pentachlorophenol	mg/kg	37 : 49 : 49	4.40E+01	2.65E-01	9.87E-01	3.00E-02	Yes	Yes	Yes	1.68E-02	Yes	Yes
Silver	mg/kg	10 : 49 : 49	9.00E+00	8.06E-01	7.78E-01	8.50E+00	Yes	Yes	No			
Tetrachloroethene	mg/kg	3 : 48 : 49	7.00E-02	5.10E-03	5.27E-03	6.00E-02	Yes	No	No			
Zinc	mg/kg	49 : 49 : 49	1.05E+04	6.16E+03	2.16E+03	6.20E+03	Yes	No	No			
CS-C												
Cadmium	mg/kg	9 : 9 : 9	2.40E+01	1.74E+01	1.33E+01	7.50E+00	Yes	Yes	Yes	4.01E+00	Yes	Yes
Chromium	mg/kg	9 : 9 : 9	1.10E+02	5.83E+01	3.61E+01	3.80E+01	Yes	Yes	No			
delta-BHC	mg/kg	3 : 6 : 9	9.90E-04	1.00E-03	6.65E-04	5.00E-04	Yes	Yes	Yes	2.18E-03	No	No
Dieldrin	mg/kg	8 : 9 : 9	1.10E-02	1.10E-02	4.76E-03	4.00E-03	Yes	Yes	Yes	1.63E-02	No	No
Nickel	mg/kg	9 : 9 : 9	5.70E+02	3.57E+02	2.63E+02	1.30E+02	Yes	Yes	Yes	4.80E+02	Yes	No

Table G-3
TACO Tier 2 SGW RO Comparison
Sauget Area 1 - Creek Bottom Soils
Human Health Risk Assessment

Constituent	Units	FOD	Maximum Detected Concentration (Max)	Exposure Point Concentration (EPC)	Average (Avg)	TACO Tier 1 Class I Soil-to-groundwater (SGW) RO	Is Max>Tier 1 SGW?	Is EPC>Tier 1 SGW?	Is Avg>Tier 1 SGW?	TACO Tier 2 Class I Soil-to-groundwater (SGW) RO	Is Max>Tier 2 SGW?	Is Avg>Tier 2 SGW?
CS-D												
Cadmium	mg/kg	6 : 6 : 6	4.00E+01	4.00E+01	1.98E+01	5.20E+00	Yes	Yes	Yes	3.87E+00	Yes	Yes
Chromium	mg/kg	6 : 6 : 6	5.70E+01	5.70E+01	4.93E+01	4.00E+01	Yes	Yes	Yes	9.47E+02	No	No
delta-BHC	mg/kg	4 : 5 : 6	1.90E-03	1.90E-03	8.24E-04	5.00E-04	Yes	Yes	Yes	2.04E-03	No	No
Dieldrin	mg/kg	5 : 6 : 6	6.90E-01	6.90E-01	1.27E-01	4.00E-03	Yes	Yes	Yes	1.53E-02	Yes	Yes
Nickel	mg/kg	6 : 6 : 6	5.30E+02	5.30E+02	2.87E+02	1.00E+02	Yes	Yes	Yes	4.62E+02	Yes	No
Zinc	mg/kg	6 : 6 : 6	8.20E+03	8.20E+03	4.10E+03	5.10E+03	Yes	Yes	No			
CS-E												
alpha-BHC	mg/kg	1 : 15 : 17	1.30E-03	5.00E-03	4.21E-04	5.00E-04	Yes	Yes	No			
Cadmium	mg/kg	17 : 17 : 17	3.80E+01	2.31E+01	1.42E+01	7.50E+00	Yes	Yes	Yes	4.18E+00	Yes	Yes
Chromium	mg/kg	17 : 17 : 17	1.70E+02	7.27E+01	4.73E+01	3.80E+01	Yes	Yes	Yes	1.02E+03	No	No
Dieldrin	mg/kg	13 : 17 : 17	3.40E-02	2.26E-02	5.49E-03	4.00E-03	Yes	Yes	Yes	1.53E-02	Yes	No
Nickel	mg/kg	17 : 17 : 17	6.00E+02	2.67E+02	1.81E+02	1.30E+02	Yes	Yes	Yes	5.00E+02	Yes	No
Pentachlorophenol	mg/kg	7 : 17 : 17	3.30E-02	2.07E-02	1.13E-02	3.00E-02	Yes	Yes	No			
Silver	mg/kg	3 : 17 : 17	9.80E+00	1.38E+00	1.20E+00	8.50E+00	Yes	Yes	No	[redacted]	[redacted]	[redacted]
CS-F												
1,1,2,2-Tetrachloroethane	mg/kg	1 : 16 : 16	1.00E-02	4.40E-03	3.91E-03	3.00E-03	Yes	Yes	Yes	9.59E-04	Yes	Yes
beta-BHC	mg/kg	1 : 16 : 16	3.90E-03	1.10E-03	8.21E-04	5.00E-04	Yes	Yes	Yes	2.22E-03	Yes	No
Cadmium	mg/kg	15 : 16 : 16	5.70E+01	2.80E+01	2.03E+01	1.10E+01	Yes	Yes	Yes	7.31E+00	Yes	Yes
Dieldrin	mg/kg	9 : 16 : 16	8.20E-03	3.70E-03	2.30E-03	4.00E-03	Yes	Yes	No	[redacted]	[redacted]	[redacted]
Nickel	mg/kg	16 : 16 : 16	6.30E+02	3.29E+02	1.67E+02	1.80E+02	Yes	Yes	No			
Pentachlorophenol	mg/kg	8 : 16 : 16	2.40E-02	1.17E-02	9.11E-03	2.00E-02	Yes	Yes	No			
Zinc	mg/kg	16 : 16 : 16	1.50E+04	5.37E+03	2.24E+03	7.50E+03	Yes	Yes	No			
Site M												
1,4-Dichlorobenzene	mg/kg	3 : 9 : 9	4.10E+00	4.10E+00	9.78E-01	2.00E+00	Yes	Yes	No			
alpha-BHC	mg/kg	1 : 5 : 9	2.30E-03	2.30E-03	1.48E-03	5.00E-04	Yes	Yes	Yes	1.53E-03	Yes	No
Antimony	mg/kg	5 : 9 : 9	6.80E+00	5.27E+00	2.91E+00	5.00E+00	Yes	Yes	No			
Benzene	mg/kg	4 : 9 : 9	3.70E-02	1.77E-02	8.35E-03	3.00E-02	Yes	Yes	No			
Chlorobenzene	mg/kg	8 : 9 : 9	1.20E+00	1.20E+00	3.38E-01	1.00E+00	Yes	Yes	No			
Chromium	mg/kg	9 : 9 : 9	5.50E+01	2.59E+01	1.85E+01	3.20E+01	Yes	Yes	No			
Heptachlor epoxide	mg/kg	3 : 9 : 9	8.60E-01	8.60E-01	1.08E-01	7.00E-01	Yes	Yes	No			
Nickel	mg/kg	9 : 9 : 9	1.50E+03	1.26E+03	4.80E+02	7.00E+02	Yes	Yes	No			
Pentachlorophenol	mg/kg	9 : 9 : 9	2.90E-01	1.90E-01	6.37E-02	2.00E-02	Yes	Yes	Yes	1.33E-02	Yes	Yes

Notes:
FOD - Frequency of Detection.
RO - Remediation Objective.
TACO - Tiered Approach to Corrective Action Objectives.

Sample ID	TOC (mg/kg)	foc
CS-B		
CBS-CSB-T0-C1	63000	0.063
CBS-CSB-T1-C1	16000	0.016
CBS-CSB-T1-E1	13000	0.013
CBS-CSB-T1-W1	10000	0.01
CBS-CSB-T10-C1	17000	0.017
CBS-CSB-T10-E1	14000	0.014
CBS-CSB-T10-W1	9400	0.0094
CBS-CSB-T11-C1	17000	0.017
CBS-CSB-T11-C1-D	18000	0.018
CBS-CSB-T11-E1	12000	0.012
CBS-CSB-T11-W1	7600	0.0076
CBS-CSB-T12-C1	17000	0.017
CBS-CSB-T12-E1	9400	0.0094
CBS-CSB-T12-W1	11000	0.011
CBS-CSB-T13-C1	17000	0.017
CBS-CSB-T13-E1	9400	0.0094
CBS-CSB-T13-W1	8500	0.0085
CBS-CSB-T14-1	11000	0.011
CBS-CSB-T15-1	8800	0.0088
CBS-CSB-T16-1	14000	0.014
CBS-CSB-T17-C1	27000	0.027
CBS-CSB-T17-E1	28000	0.028
CBS-CSB-T17-E1D	18000	0.018
CBS-CSB-T17-WI	21000	0.021
CBS-CSB-T18-C1	17000	0.017
CBS-CSB-T18-E1	8500	0.0085
CBS-CSB-T18-W1	13000	0.013
CBS-CSB-T18-W1D	13000	0.013
CBS-CSB-T2-C1	16000	0.016
CBS-CSB-T2-E1	16000	0.016
CBS-CSB-T2-W1	7300	0.0073
CBS-CSB-T3-C1	23000	0.023
CBS-CSB-T3-E1	20000	0.02
CBS-CSB-T3-W1	6800	0.0068
CBS-CSB-T4-C1	21000	0.021
CBS-CSB-T4-E1	13000	0.013
CBS-CSB-T4-W1	8000	0.008
CBS-CSB-T5-C1	17000	0.017
CBS-CSB-T5-E1	9400	0.0094
CBS-CSB-T5-W1	8100	0.0081
CBS-CSB-T6-C1	17000	0.017
CBS-CSB-T6-C1-D	18000	0.018
CBS-CSB-T6-E1	12000	0.012
CBS-CSB-T6-W1	15000	0.015
CBS-CSB-T7-C1	10000	0.01
CBS-CSB-T7-E1	14000	0.014
CBS-CSB-T7-W1	6600	0.0066
CBS-CSB-T8-C1	4100	0.0041
CBS-CSB-T8-E1	16000	0.016
CBS-CSB-T8-W1	8800	0.0088
CBS-CSB-T9-C1	14000	0.014
CBS-CSB-T9-E1	11000	0.011
CBS-CSB-T9-W1	8300	0.0083
Average for CS-B		*0.0145*

Sample ID	TOC (mg/kg)	foc
CS-C		
CBS-CSC-T1-1	12000	0.012
CBS-CSC-T2-1	14000	0.014
CBS-CSC-T3-1	24000	0.024
CBS-CSC-T4-1	15000	0.015
CBS-CSC-T4-1-FD	16000	0.016
CBS-CSC-T5-1	18000	0.018
CBS-CSC-T6-1	33000	0.033
CBS-CSC-T7-1	15000	0.015
CBS-CSC-T8-1	23000	0.023
CBS-CSC-T9-1	15000	0.015
Average for CS-C		*0.0185*
CS-D		
CBS-CSD-T1-1	16000	0.016
CBS-CSD-T2-1	20000	0.02
CBS-CSD-T3-1	13000	0.013
CBS-CSD-T4-1	19000	0.019
CBS-CSD-T5-1	11000	0.011
CBS-CSD-T6-1	29000	0.029
Average for CS-D		*0.0180*
CS-E		
CBS-CSE-T1-1	12000	0.012
CBS-CSE-T10-1	16000	0.016
CBS-CSE-T11-1	15000	0.015
CBS-CSE-T12-1	12000	0.012
CBS-CSE-T13-2	23000	0.023
CBS-CSE-T14-1	13000	0.013
CBS-CSE-T15-1	6900	0.0069
CBS-CSE-T15-1-FD	6900	0.0069
CBS-CSE-T16-1	50000	0.05
CBS-CSE-T17-1	23000	0.023
CBS-CSE-T2-1	9400	0.0094
CBS-CSE-T3-1	18000	0.018
CBS-CSE-T3-1-FD	13000	0.013
CBS-CSE-T4-1	17000	0.017
CBS-CSE-T5-1	9600	0.0096
CBS-CSE-T6-1	24000	0.024
CBS-CSE-T7-1	17000	0.017
CBS-CSE-T8-1	15000	0.015
CBS-CSE-T9-1	15000	0.015
Average for CS-E		*0.0166*

Sample ID	TOC (mg/kg)	foc
CS-F		
CBS-CSF-T1-1	7900	0.0079
CBS-CSF-T10-1	3100	0.0031
CBS-CSF-T11-1	5200	0.0052
CBS-CSF-T12-1	2900	0.0029
CBS-CSF-T13-1	7500	0.0075
CBS-CSF-T14-1	12000	0.012
CBS-CSF-T15-1	5300	0.0053
CBS-CSF-T15-1-FD	1700	0.0017
CBS-CSF-T16-1	7800	0.0078
CBS-CSF-T2-1	15000	0.015
CBS-CSF-T3-1	28000	0.028
CBS-CSF-T4-1	8800	0.0088
CBS-CSF-T5-1	11000	0.011
CBS-CSF-T6-1	11000	0.011
CBS-CSF-T6-1-FD	10000	0.01
CBS-CSF-T7-1	6300	0.0063
CBS-CSF-T8-1	6600	0.0066
CBS-CSF-T9-1	8500	0.0085
CBS-CSF-T9-1-FD	3700	0.0037
Average for CS-F		*0.0085*
SITE M		
SED-M-S10 0-6	46000	0.046
SED-M-S2 0-6	6000	0.006
SED-M-S3-(0-6)	13000	0.013
SED-M-S4-(0-6)	32000	0.032
SED-M-S5 0-6	8700	0.0087
SED-M-S6-(0-6)	6100	0.0061
SED-M-S7-(0-6)	29000	0.029
SED-M-S7-FD(0-6)	28000	0.028
SED-M-S8 0-6	14000	0.014
SED-M-S9-(0-6)	11000	0.011
Average for Site M		*0.0194*

Well (a)	Constituent (b)	Detected Concentration (ug/L)	TACO Class I Groundwater Criteria (ug/L)	Is Detected Concentration Less than Class I Groundwater Criteria?
AA-SW-S1	None detected	--	--	None detected
AA-SW-S2	None detected	--	--	None detected
AA-SW-S3	None detected	--	--	None detected
AA-GHL-S2	None detected	--	--	None detected
AA-GHL-S3	None detected	--	--	None detected
EEG-104	Dieldrin	0.0026	0.02	Yes
EEG-103	None detected	--	--	None detected
EEG-105	Pentachlorophenol	0.097	1	Yes
EEG-111	Pentachlorophenol	0.13	1	Yes
SGW-S1	Dieldrin	0.0032	0.02	Yes
DW-MCDO	None detected	--	--	None detected
DW-SCHM	None detected	--	--	None detected
DW-SETT	None detected	--	--	None detected
DW-WRIG	Cadmium	1	5	Yes
SGW-2	None detected	--	--	None detected

Notes:
(a) - Wells identified as those downgradient of CS-B that are not directly located within Site G (see Figure 3-2 of ENSR, 2001, Attachment B of this Appendix).
(b) - Data are presented only for constituents exceeding the Tier 2 evaluation as identified in Table G-3 (1,1,2,2-tetrachloroethane, cadmium, dieldrin, nitrobenzene, and pentachlorophenol). If constituent is not listed, it was not detected in the well.

TABLE G-6
Comparison of Concentration of Constituents listed in Table G-2 to CS-B Concentrations
Sauget Area 1- Creek Bottom Soils
Human Health Risk Assessment

Constituent	Concentration (mg/kg)	CS-B	CS-C	CS-D	CS-E	CS-F	Site M	Notes
Chromium	Maximum	180	110	57	170	29	55	All concentrations less than in CS-B.
	EPC	90	58	57	73	19	26	
	Arithmetic Mean	51	36	49	47	17	19	
delta-BHC	Maximum	0.0041	0.0010	0.0019	<SGW	<SGW	<SGW	All concentrations less than in CS-B.
	EPC	0.0006	0.0010	0.0019				
	Arithmetic Mean	0.0005	0.0007	0.0008				
Dieldrin	Maximum	0.049	0.0110	0.69	0.034	0.0082	<SGW	CS-D>CS-B. Not industry-related.
	EPC	0.0089	0.0110	0.69	0.0226	0.0023		
	Arithmetic Mean	0.0077	0.0048	0.124	0.0055	0.0037		
Nickel	Maximum	630	570	530	600	630	1500	All concentration less than in CS-B. Site M is upgradient of EEG-105, AA-SW-S2, and AA-SW-S3.
	EPC	228	357	530	267	330	1261	
	Arithmetic Mean	192	263	287	181	167	480	
Zinc	Maximum	10450	3400	8200	5900	15000	12000	Maximum in CS-F is greater than CS-B, but EPC and Arithmetic Mean are about equal to CS-B.
	EPC	6163	2776	8200	3115	5373	11561	
	Arithmetic Mean	2161	2137	4100	1924	2238	3089	
alpha-BHC	Maximum	0.0029	<SGW	<SGW	0.0013	<SGW	0.0023	All concentrations less than in CS-B.
	EPC	0.0007			0.0005		0.0023	
	Arithmetic Mean	0.0006			0.0004		0.0015	
Pentachlorophenol	Maximum	44	0.014	0.013	0.0330	0.0240	0.29	All concentrations less than in CS-B.
	EPC	0.26	0.014	0.013	0.0207	0.0117	0.19	
	Arithmetic Mean	0.99	0.0061	0.0069	0.0113	0.0091	0.064	
Silver	Maximum	9	<SGW	1.5	9.8	0.79	5.6	Concentrations are close. CS-E FOD=3:17, CS-B FOD=10:49
	EPC	0.8		1.5	1.38	0.69	4.61	
	Arithmetic Mean	0.8		0.825	1.2	0.665	1.67	
beta-BHC	Maximum	0.0077	<SGW	<SGW	<SGW	0.0039	<SGW	All concentrations less than in CS-B. FOD = 1:16
	EPC	0.0015				0.0011		
	Arithmetic Mean	0.0013				0.0008		

TABLE G[illegible]
Comparison of Concentration of Constituents listed in Table G-2 to CS-B Concentrations
Sauget Area 1- Creek Bottom Soils
Human Health Risk Assessment

Constituent	Concentration (mg/kg)	CS-B	CS-C	CS-D	CS-E	CS-F	Site M	Notes
1,1,2,2-TCA	Maximum					0.01		
	EPC	<SGW	<SGW	<SGW	<SGW	0.0044	<SGW	FOD = 1:16, one detect in whole creek.
	Arithmetic Mean					0.0039		
Cadmium	Maximum	54	24	40	38	57	17	
	EPC	26	17.4	40	23.07	28	13.4	All concentrations less than in CS-B.
	Arithmetic Mean	8.2	13.3	19.75	14.2	20.3	4.92	

ATTACHMENT A

Calculation of Dilution Factor

A. Calculation of the Dilution Factor (DF)

$$DF = 1 + \frac{K \cdot i \cdot d}{I \cdot L}$$

K	hydraulic conductivity	0.16 cm/s	138 meters/day	"Dead Creek Final Remedy Engineering Evaluation/Feasibility Study Volume I, June 21, 2002."
i	hydraulic gradient	0.001	0.001	
d	mixing zone depth	98 ft	29.87 meters	
I	infiltration rate	0.3 m/yr	0.3 m/yr	Default TACO value
L	source length (stream width)			

Segment	L (meters)[1]	DF
B	15	1.92
C	13	2.06
D	14	1.98
E	12	2.15
F	5	3.75
M	96	1.14

[1] - Stream width was averaged over stream length. "Dead Creek Final Remedy Creek Bottom Soil Engineering Evaulation/Cost Analysis Volume II, June 21, 2002"

B. Summary Table of Input Parameters

	Gwobj[2] CLASS I (mg/L)	Koc[3]	Kd[4]
1,1,2,2-tetrachloroethane	0.000055	524	
alpha-BHC	0.00003	1230	
beta-BHC	0.00003	2300	
cadmium	0.005		390
chromium	0.1		4778
delta-BHC	0.00003	1900	
dieldrin	0.00002	21400	
nickel	0.1		2333
nitrobenzene	0.0035	64.6	
pentachlorophenol	0.001	592	
zinc	5		1731

[2] - TACO regulations, Appendix B Table E, except for 1,1,2,2-tetrachloroethane, which is from Region IX PRGs.
GWobj for beta-BHC and delta-BHC, assumed to be equal to alpha-BHC, as given in TACO guidance.
GWobj for Chromium is for total Chromium, as given in TACO guidance.

[3] - TACO regulations, Appendix C Table E, except for beta-BHC and delta-BHC, which are not reported in the TACO regulations and so, were taken from the PA Act 2 guidance.

[4] - From Sauve, Hendershot, and Allen. 2000.

C. Input values for Taco Equation

Remediation Objective (mg/kg) = C_w *(K_d +((Θ_w + Θ_a*H')/ρ_b))
For Θ_a = 0, Remediation Objective (mg/kg) = C_w *(K_d +(Θ_w/ρ_b))

C_w =	DF*GWobj	
Θ_a =	0	air filled porosity for sand, assumed saturated.
Θ_w =	0.32	water filled soil porosity.
ρ_b =	1.8	dry soil bulk density for sand, TACO default for sand.
K_d =	Koc * foc	For organics, fixed value for inorganics.

Segment	foc[a]
B	0.0145
C	0.0185
D	0.0180
E	0.0166
F	0.0085
M	0.0194

[a] - foc was calculated from TOC field data.
foc was averaged over each stream segment.

Cw (segment F)= 0.0002 =DF segment F*Gwobj for chemical

ρ_b = 1.8 dry soil bulk density for sand
K_d = *Koc*foc soil water partition coefficient*
Koc = 524 organic partition coefficient for chemical

Segment	foc	Kd
F	0.0065	4.476

θ_w = 0.32

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment F	0.000959	1.00E-02	no	0.0039	no

ATTACHMENT A

alpha-BHC

Cw (segment B)=	0.0001	=DF segment B*Gwobj for chemical
Cw (segment M)=	0.0000	=DF segment M*Gwobj for chemical

ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
Koc =	2300	organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	33.372
M	0.0194	44.574

θ_w = 0.20 water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	0.002	2.90E-03	no	5.85E-04	yes
Segment M	0.002	2.30E-03	no	1.48E-03	yes

Cw (segment B)= 0.0001 =DF segment B*Gwobj for chemical
Cw (segment F)= 0.0001 =DF segment F*Gwobj for chemical

ρ_b = 1.8 dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 2300 organic partition coefficient for chemical

Segment	*foc*	*Kd*
B	0.0145	33.372
F	0.0085	19.647

θ_w = 0.20 water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	0.0019	*0.0077*	no	1.25E-03	yes
Segment F	0.0022	0.0039	no	8.21E-04	yes

ATTACHMENT A

cadmium

Cw (segment B)=	0.0096	=DF segment B*Gwobj for chemical
Cw (segment C)=	0.0103	=DF segment C*Gwobj for chemical
Cw (segment D)=	0.0099	=DF segment D*Gwobj for chemical
Cw (segment E)=	0.0107	=DF segment E*Gwobj for chemical
Cw (segment F)=	0.0187	=DF segment F*Gwobj for chemical
ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	390	
θ_w =	0.32	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	3.74	54	no	8.25	no
Segment C	4.01	24	no	13.28	no
Segment D	3.87	40	no	19.75	no
Segment E	4.18	38	no	14.21	no
Segment F	7.31	57	no	20.31	no

Cw (segment B)= 0.1916 =DF segment B*Gwobj for chemical
Cw (segment D)= 0.1981 =DF segment D*Gwobj for chemical
Cw (segment E)= *0.2145 =DF segment E*Gwobj for chemical*

ρ_b = 1.8 dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
K_d = 4778

θ_w = 0.32 water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	915.52	180	yes	51.30	yes
Segment D	946.78	57	yes	49.30	yes
Segment E	1024.94	170	yes	47.30	yes

Cw (segment B)=	0.0001	=DF segment B*Gwobj for chemical
Cw (segment C)=	0.0001	=DF segment C*Gwobj for chemical
Cw (segment D)=	0.0001	=DF segment D*Gwobj for chemical

ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
Koc =	1900	organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	27.568
C	0.0185	35.150
D	0.0180	34.200

θ_w = 0.32

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	0.001595	0.0041	no	0.0005	yes
Segment C	0.002180	9.90E-04	yes	0.0007	yes
Segment D	0.002044	1.90E-03	yes	0.0008	yes

Cw (segment B)= 0.000038 =DF segment B*Gwobj for chemical
Cw (segment C)= 0.000041 =DF segment C*Gwobj for chemical
Cw (segment D)= 0.000040 =DF segment D*Gwobj for chemical
Cw (segment E)= 0.000043 =DF segment E*Gwobj for chemical

ρ_b = 1.6 dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 21400 organic partition coefficient for chemical

Segment	foc	Kd
B	0.0085	182.801
C	0.0185	395.900
D	0.0180	385.200
E	0.0166	355.691

θ_w = 0.32 water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	0.01	0.049	no	0.00772	no
Segment C	0.02	0.011	yes	0.00476	yes
Segment D	0.015	0.69	no	0.1274	no
Segment E	0.02	0.034	no	0.00549	yes

ATTACHMENT A

nickel

Cw (segment B)=	0.1916	=DF segment B*Gwobj for chemical
Cw (segment C)=	0.2057	=DF segment C*Gwobj for chemical
Cw (segment D)=	0.1981	=DF segment D*Gwobj for chemical
Cw (segment E)=	0.2145	=DF segment E*Gwobj for chemical

ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
K_d =	2333	
θ_w =	0.32	water filled soil porosity

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	447.05	630	no	192	yes
Segment C	479.93	570	no	263	yes
Segment D	462.31	530	no	287	yes
Segment E	500.48	600	no	181	yes

Cw (segment B)= 0.0067 =DF segment F*Gwobj for chemical

ρ_b = 1.8 dry soil bulk density for sand
K_d = Koc*foc soil water partition coefficient
Koc = 64.6 organic partition coefficient for chemical

Segment	foc	Kd
B	0.0145	0.937

Θ_w = 0.32

	Revised TACO Standard	Maximum Detect	pass?	Arithmetic Mean	pass?
Segment B	0.007478	0.52	no	0.1266	no

pentachlorophenol

Cw (segment B)=	0.0019	=DF segment B*Gwobj for chemical
Cw (segment M)=	0.0011	=DF segment M*Gwobj for chemical
ρ_b =	1.8	dry soil bulk density for sand
K_d =	Koc*foc	soil water partition coefficient
Koc =	592	organic partition coefficient for chemical

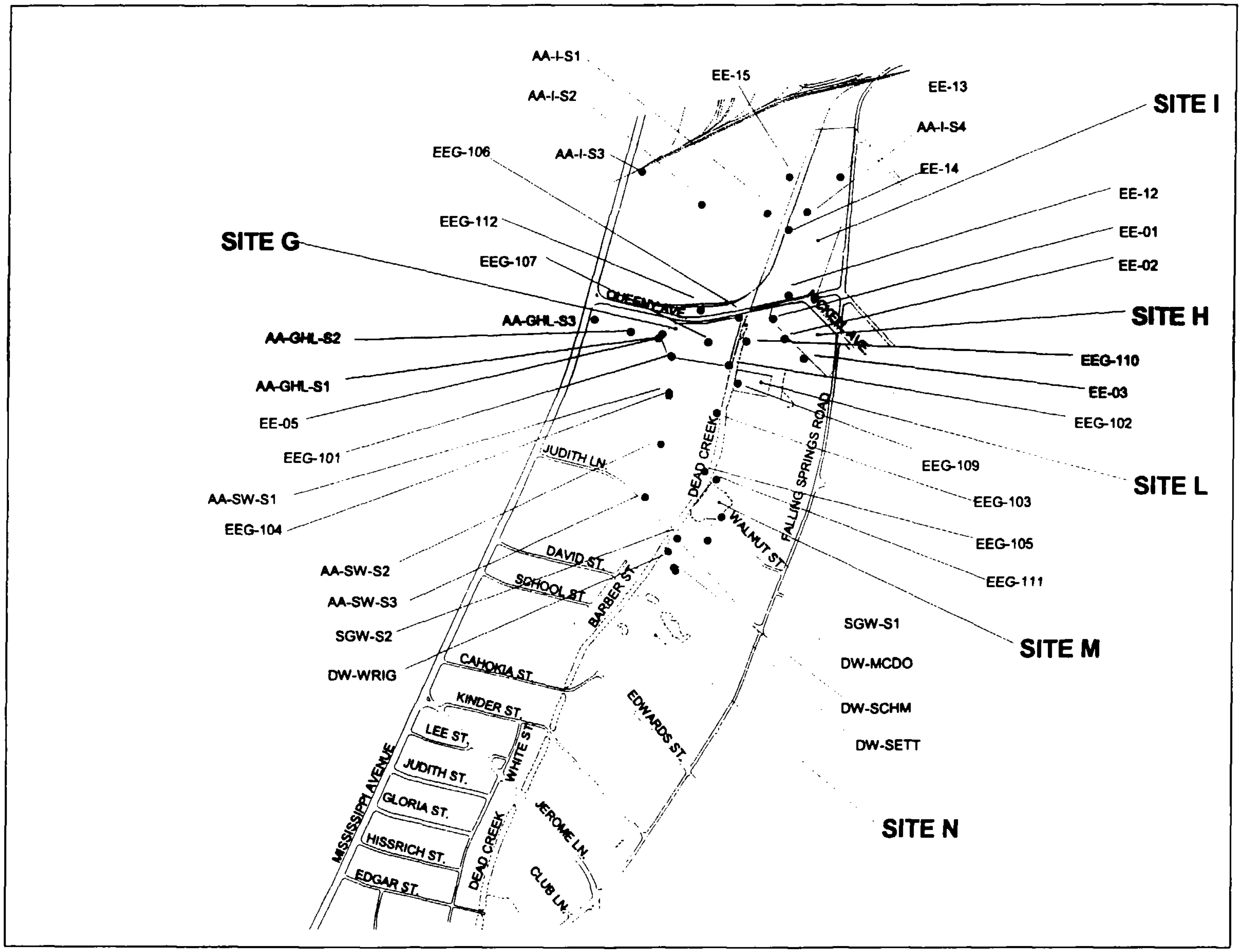
Segment	foc	Kd
B	0.0145	8.590
M	*0.0194*	*11.473*

θ_w = 0.32

	Revised TACO Standard	Maximum Detect	*pass?*	Arithmetic Mean	pass?
Segment B	0.016799	44	no	0.9874	no
Segment M	0.013318	0.29	no	0.0637	no

ATTACHMENT B

Figure 3-2 from ENSR, 2001



N

LEGEND

- Site
- Water Body
- Roads
- Groundwater Sample Locations

FIGURE 3-2
Groundwater Well Locations Evaluated in the HHRA

Sauget Area 1
EE/CA and RI/FS
Volume II
Human Health Risk Assessment

Solutia, Inc.
Remediation Technology Group
St. Louis, Missouri

2000 0 2000 Feet

ENSR INTERNATIONAL

J:/Indl_Serv/Project Files/Solutia-6105/Sauget-6105-008/Maps/ensrmaps.apr
December 29, 2000
Revision 0

ATTACHMENT C

Comparison of Groundwater Data from Downgradient Wells to TACO Class I Groundwater Standards for Constituents Exceeding Tier 2 Class I Soil-to-Groundwater Remediation Objectives

ATTACHMENT C

Comparison of Groundwater Data to TACO Tier I Screening Criteria for Class I Groundwater for Constituents Exceeding Tier 1 Class I Soil-to-Groundwater Standards

Sauget Area 1 - Creek Bottom Soils

Human Health Risk Assessment

Constituent	TACO Class I Groundwater Standard (ug/L)	Downgradient Wells AA-GHL-S2 (ug/L)	AA-GHL-S3 (ug/L)	AA-SW-S1 (ug/L)	AA-SW-S2 (ug/L)	AA-SW-S3 (ug/L)	EEG-103 (ug/L)	EEG-104 (ug/L)	EEG-105 (ug/L)	EEG-111 (ug/L)	SGW-S1 (ug/L)	DW-MCDO (ug/L)	DW-SCHM (ug/L)	DW-SETT (ug/L)	DW-WRIG (ug/L)	SGW-2 (ug/L)
Cadmium	5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	ND
Dieldrin	0.02	ND	ND	ND	ND	ND	ND	0.0026	ND	ND	0.0032	ND	ND	ND	ND	ND
Nitrobenzene	3.5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Pentachlorophenol	1	ND	ND	ND	ND	ND	ND	ND	0.097	0.13	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	0.055 (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:

ND - Not Detected

TACO - Illinois Tiered Approach to Corrective Action.

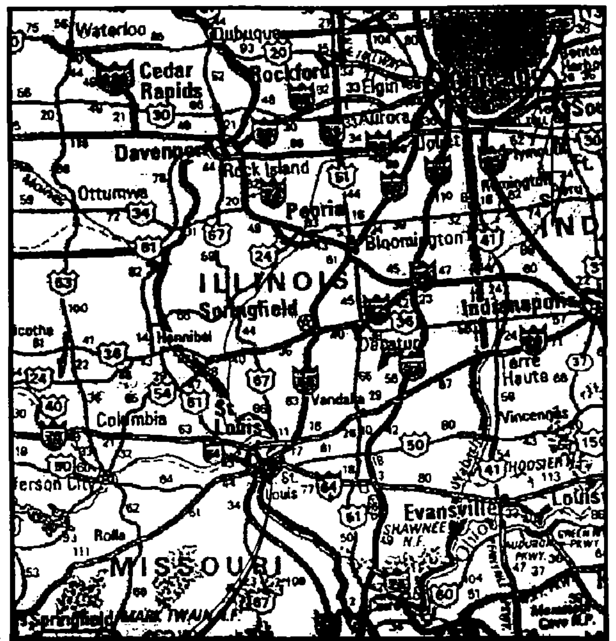
(a) - No TACO value, and no appropriate structural surrogate. Therefore, Region IX Preliminary Remediation Goal (PRG), October 1, 1999, used.

A[redacted]

CREEK SEG[redacted]R DESIGN

CONCEPTUAL DESIGN PLANS FOR
DEAD CREEK SEGMENT B LINER

CAHOKIA, ILLINOIS



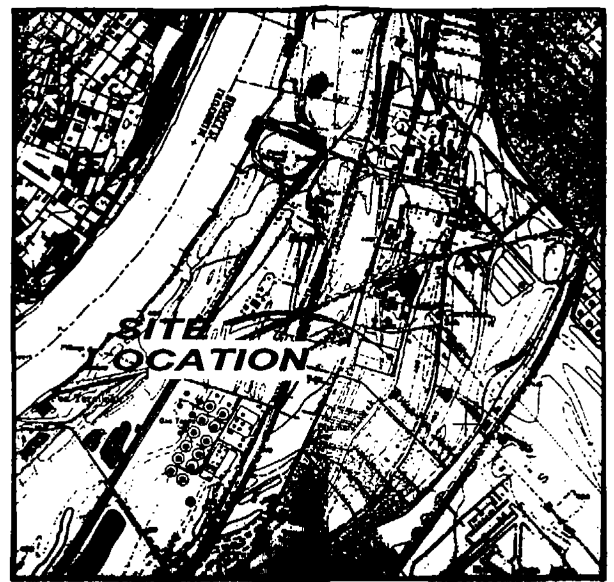
SITE LOCATION

ILLINOIS MAP

SITE LOCATION MAP

SOLUTIA

Applied Chemistry, Creative Solutions



PROJECT VICINITY MAP

INDEX OF DRAWINGS

SHEET		TITLE
1	·······	COVER SHEET
2	·······	EXISTING SITE PLAN
3	·······	PROPOSED SITE PLAN
4	·······	DETAILS
5	·······	PROPOSED CROSS SECTIONS
6	·······	PROPOSED CROSS SECTIONS
7	·······	PROPOSED CROSS SECTIONS
8	·······	PROPOSED CROSS SECTIONS
9	·······	PROPOSED CROSS SECTIONS

URS

URS Corporation Southern
7650 West Courtney
Campbell Causeway
Tampa, FL 33607-1462
No. 00000002

DSGN WJW DR WJW CHK JAJ
SUPV JAJ CH DSGN CWW
DATE MAY 30, 2003

DRAWING REVISIONS

Rev.	Description	By	Date

DEAD CREEK SEGMENT B LINER

COVER SHEET

SOLUTIA

SCALE: AS NOTED

PROJECT NUMBER
12003637.00000

DRAWING NUMBER
1

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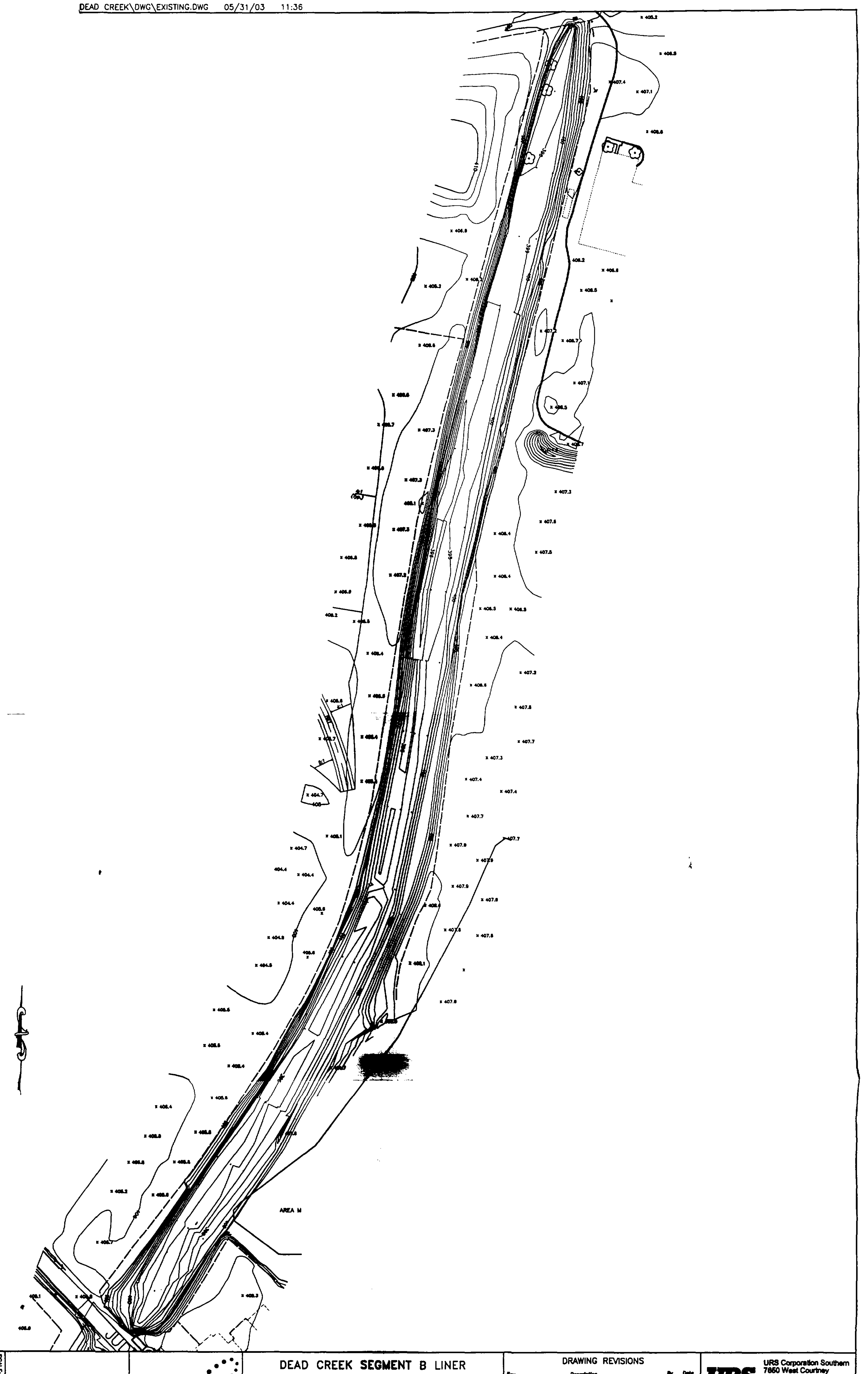

SCALE: AS NOTED

PROJECT NUMBER 12003637.00000

DRAWING NUMBER 2

SOLUTIA

DEAD CREEK SEGMENT B LINER

EXISTING SITE PLAN

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SUPV	JAJ	CH ENGR	GMW		
DATE	MAY 30, 2003				

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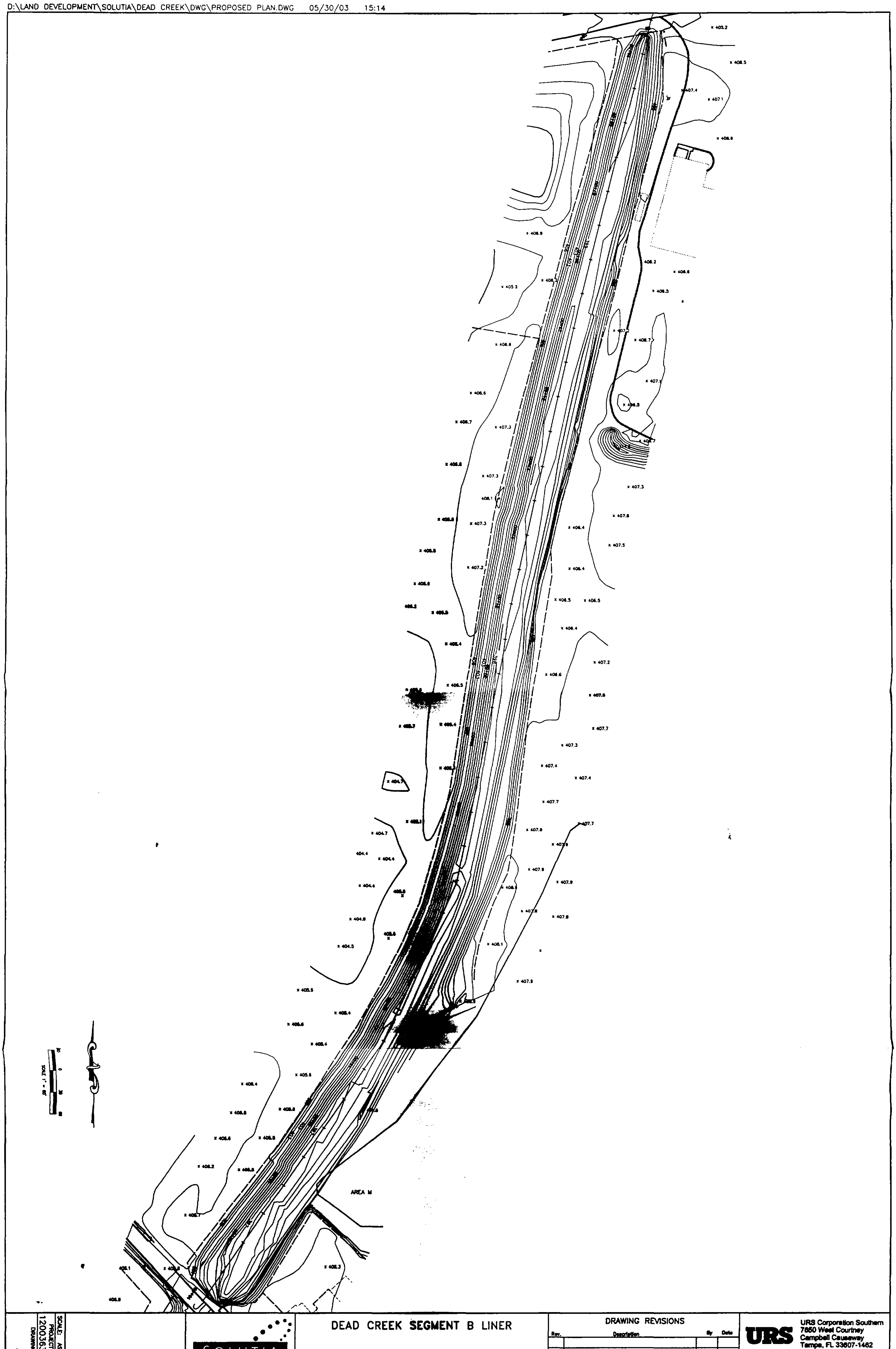

SCALE: AS NOTED
PROJECT NUMBER 12003637.00000
DRAWING NUMBER 3

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DEAD CREEK SEGMENT B LINER

PROPOSED SITE PLAN

DRAWING REVISIONS

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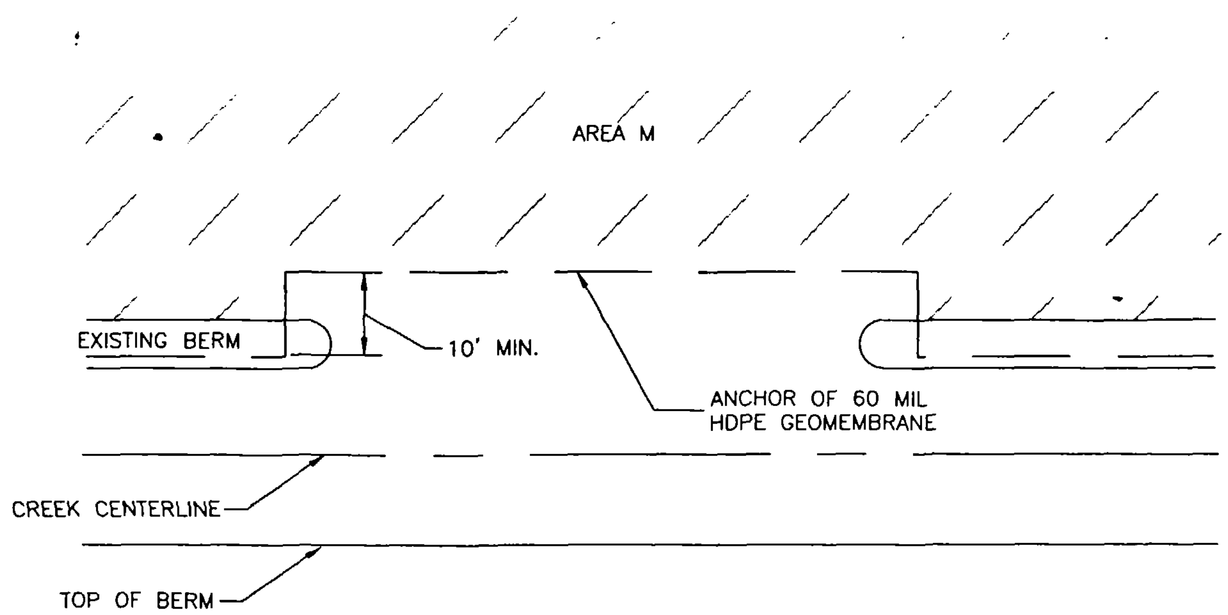
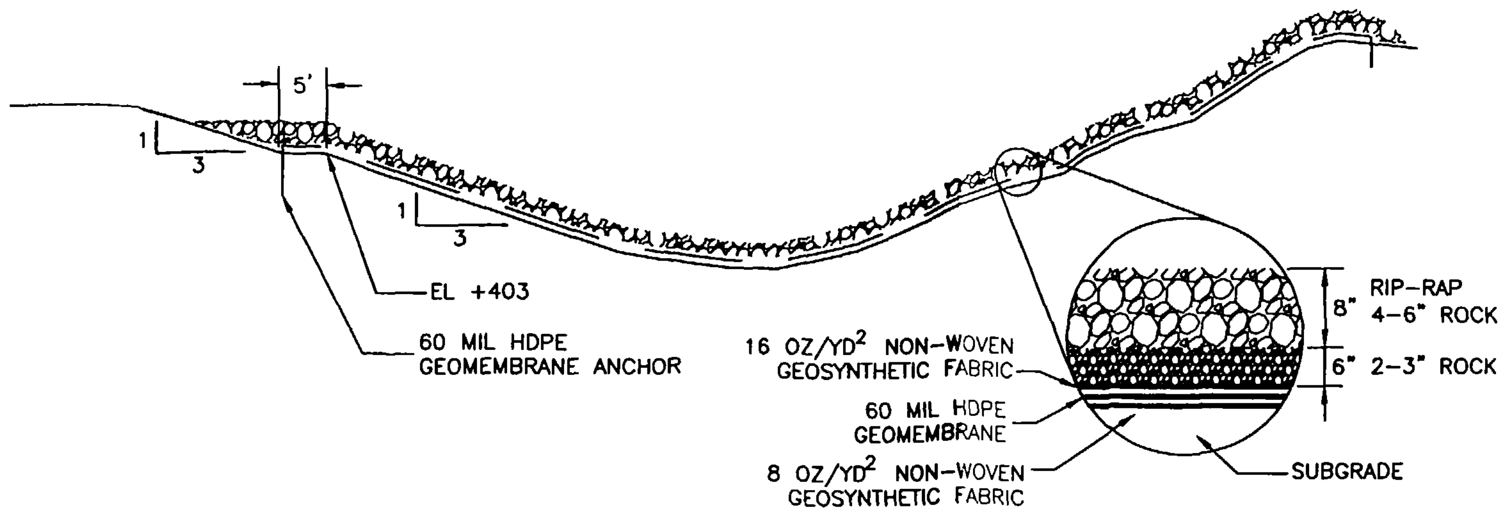
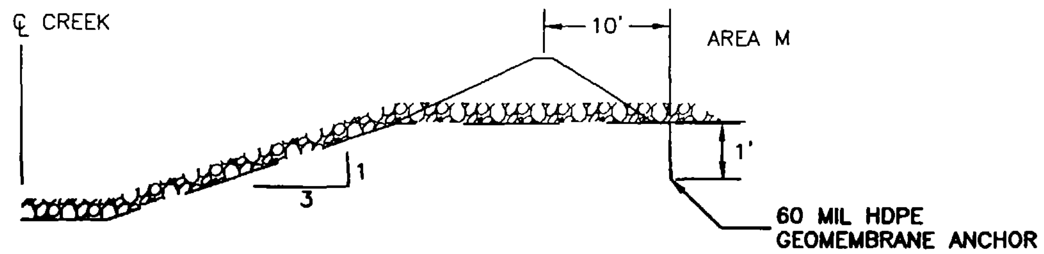
DATE MAY 30, 2003



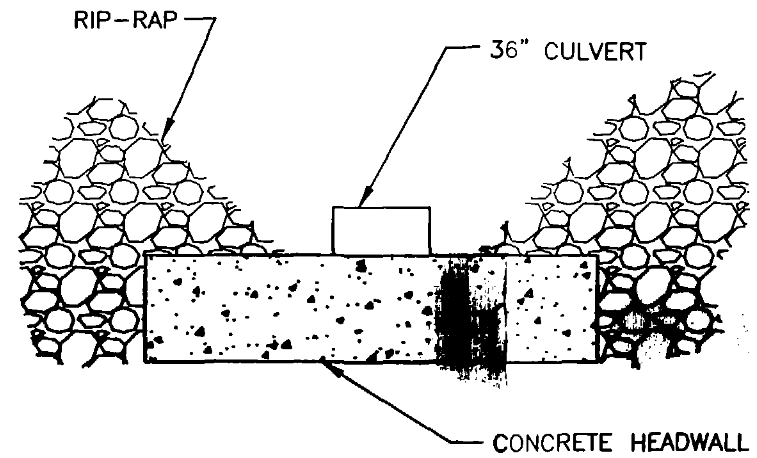
AREA M INTERFACE DETAIL – PLAN VIEW



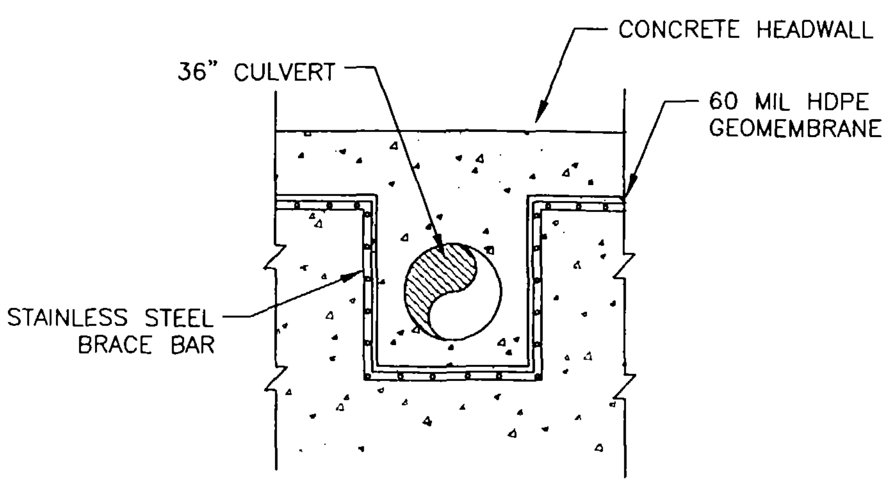
TYPICAL CREEK SECTION DETAIL



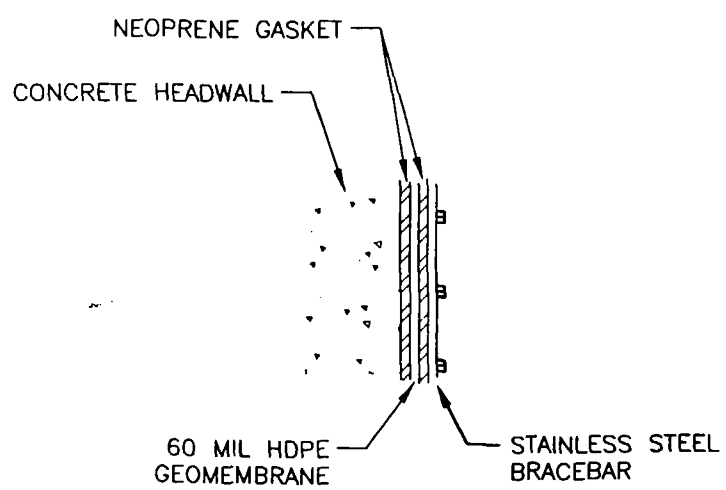
AREA M INTERFACE SECTION DETAIL



HEADWALL DETAIL – PLAN VIEW



GEOMEMBRANE SEAL TO CULVERT HEADWALL



SEAL DETAIL

NOTES:

1. GEOSYNTHETIC FABRIC SHALL MEET OR EXCEED THE MINIMUM WEIGHT/AREA SPECIFIED
2. GEOSYNTHETIC FABRIC SHALL CONSIST OF NON-WOVEN CONTINUOUS FILAMENT FIBERS
3. GEOMEMBRANE ANCHORAGE SHALL BE NO LESS THAN 1FT EMBEDMENT

URS
URS Corporation Southern
7650 West Courtney Campbell Causeway
Tampa, FL 33607-1462

DATE MAY 30, 2003

DRAWING REVISIONS

DEAD CREEK SEGMENT B LINER

DETAILS

SOLUTIA

SCALE: AS NOTED
PROJECT NUMBER 12003637.00000
DRAWING NUMBER 4

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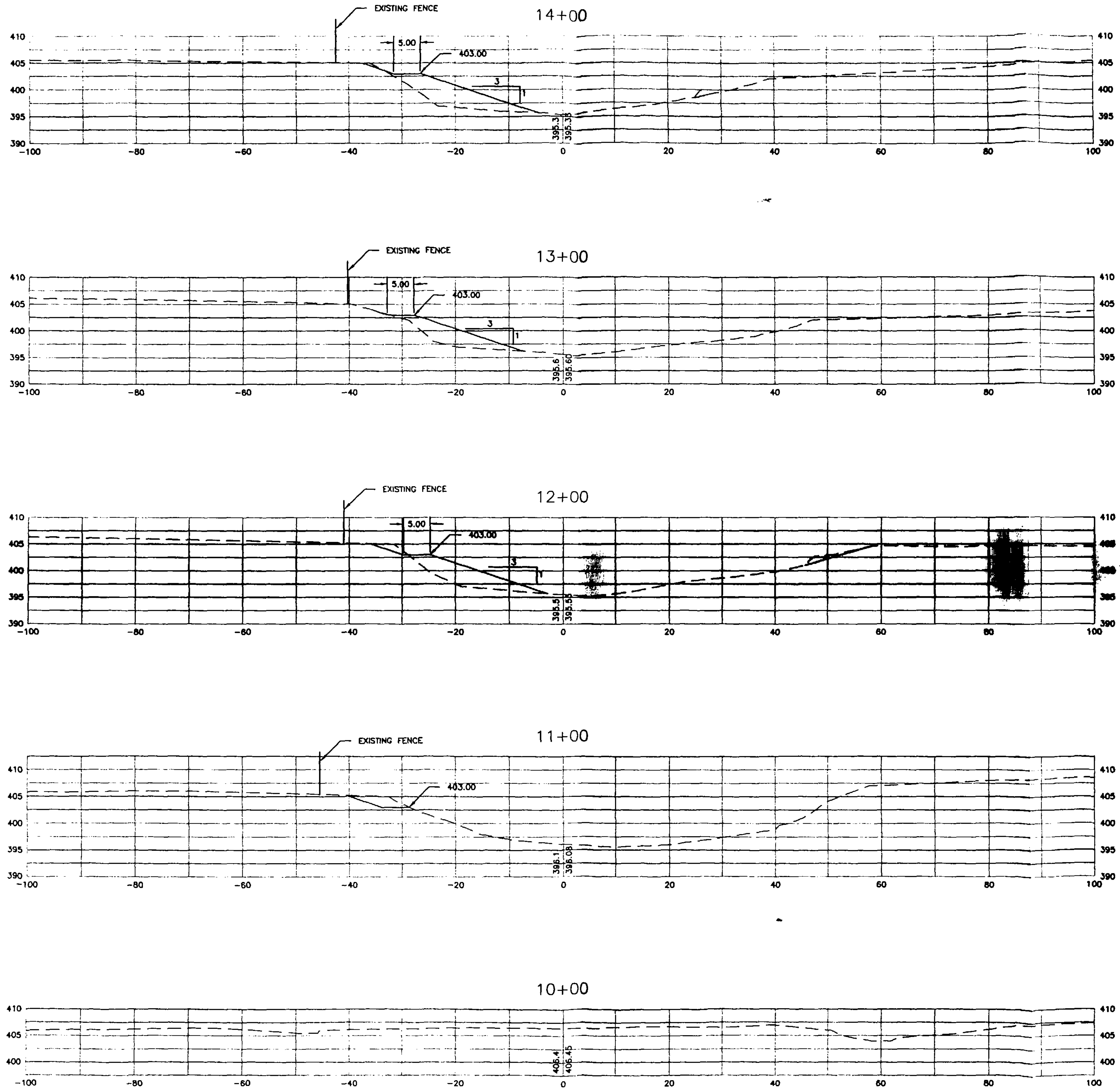

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DRAWING REVISIONS

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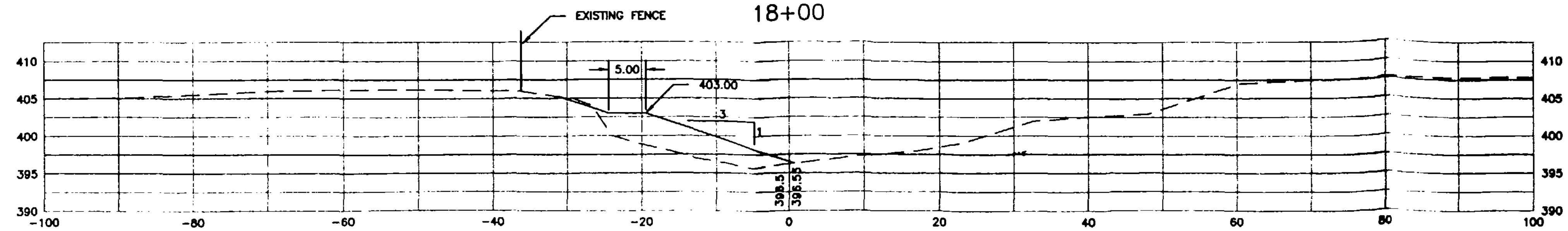
DEAD CREEK SEGMENT B LINER

PROPOSED CROSS SECTIONS

SCALE: AS NOTED
PROJECT NUMBER
12003637.00000
DRAWING NUMBER
5

18+00



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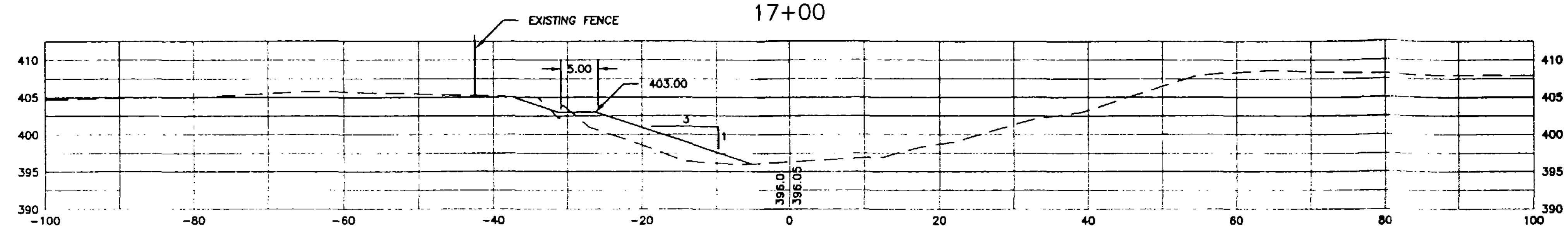

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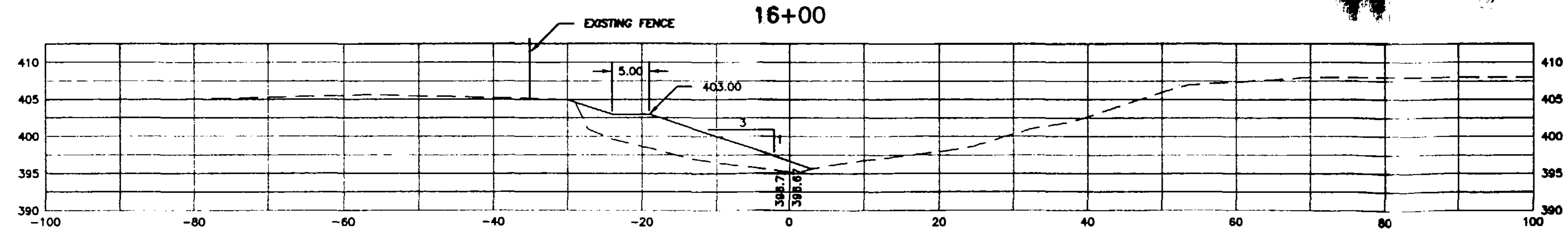

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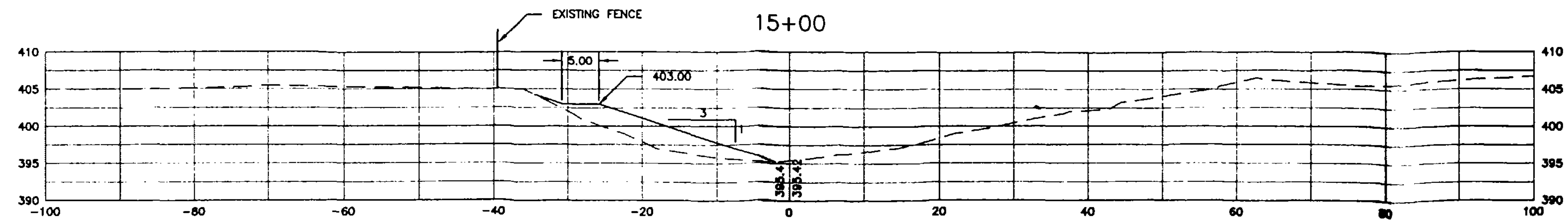

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SUPV	JAJ	CH DSGR	GAW		
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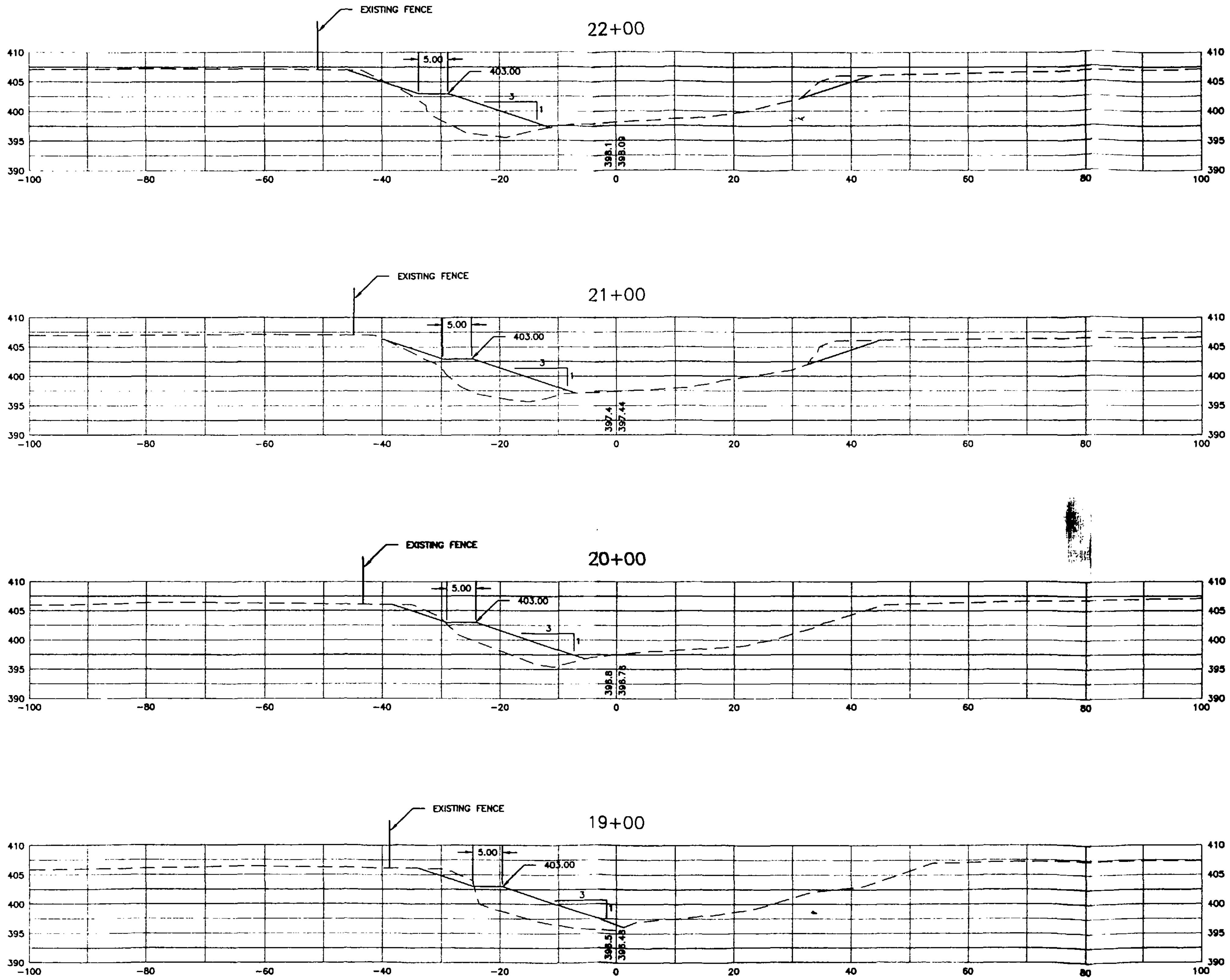
DEAD CREEK SEGMENT B LINER
PROPOSED CROSS SECTIONS

SOLUTIA

SCALE: AS NOTED

PROJECT NUMBER
12003637.00000

DRAWING NUMBER
6



URS Corporation Southern
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No. 0000002

DSGN WJW DR WJW CHK JAJ
SUPV JAJ CH DSGN GMW
DATE MAY 30, 2003

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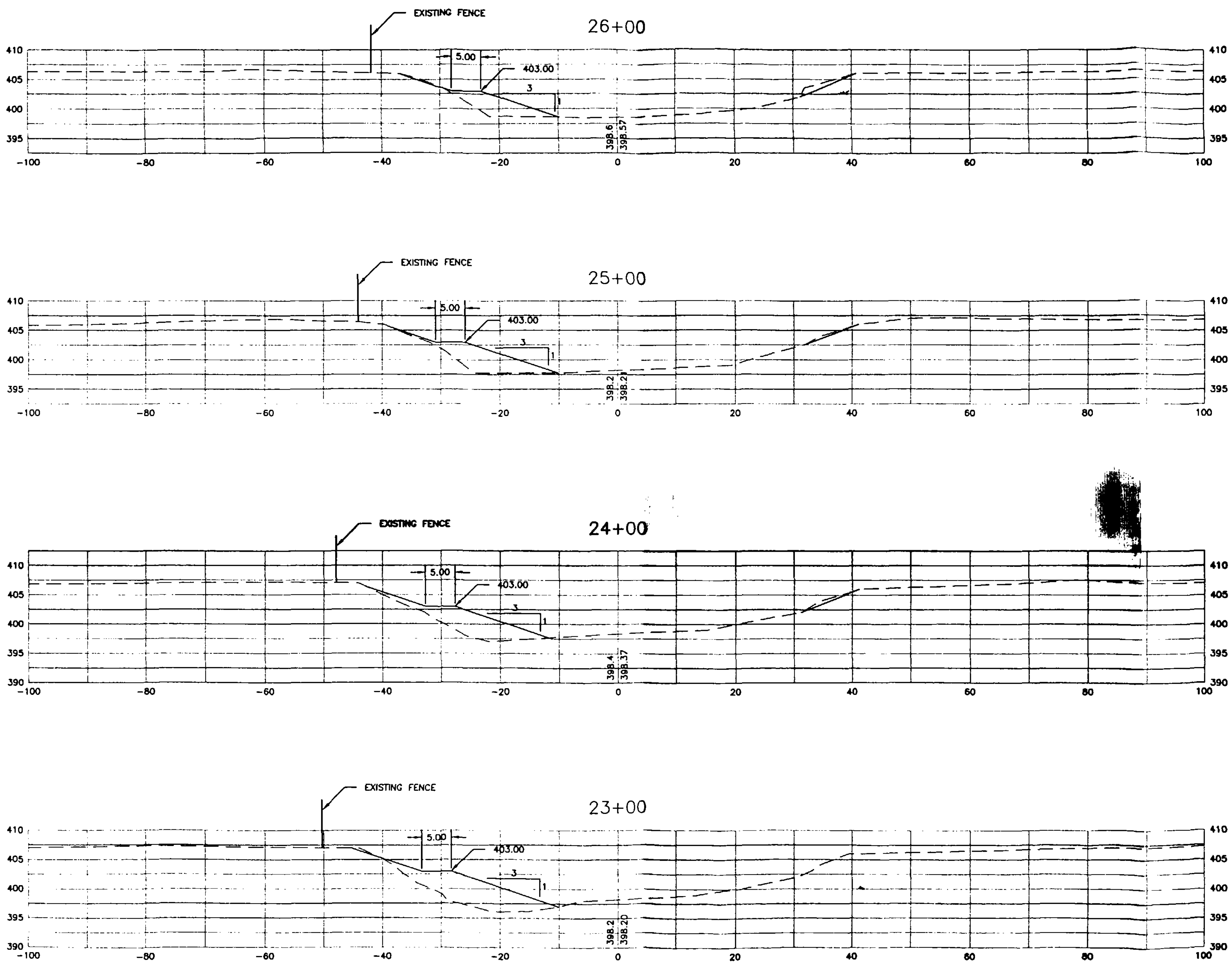
DEAD CREEK SEGMENT B LINER

PROPOSED CROSS SECTIONS

SOLUTIA

SCALE: AS NOTED
PROJECT NUMBER 12003637.00000
DRAWING NUMBER 7



DEAD CREEK SEGMENT B LINER

PROPOSED CROSS SECTIONS

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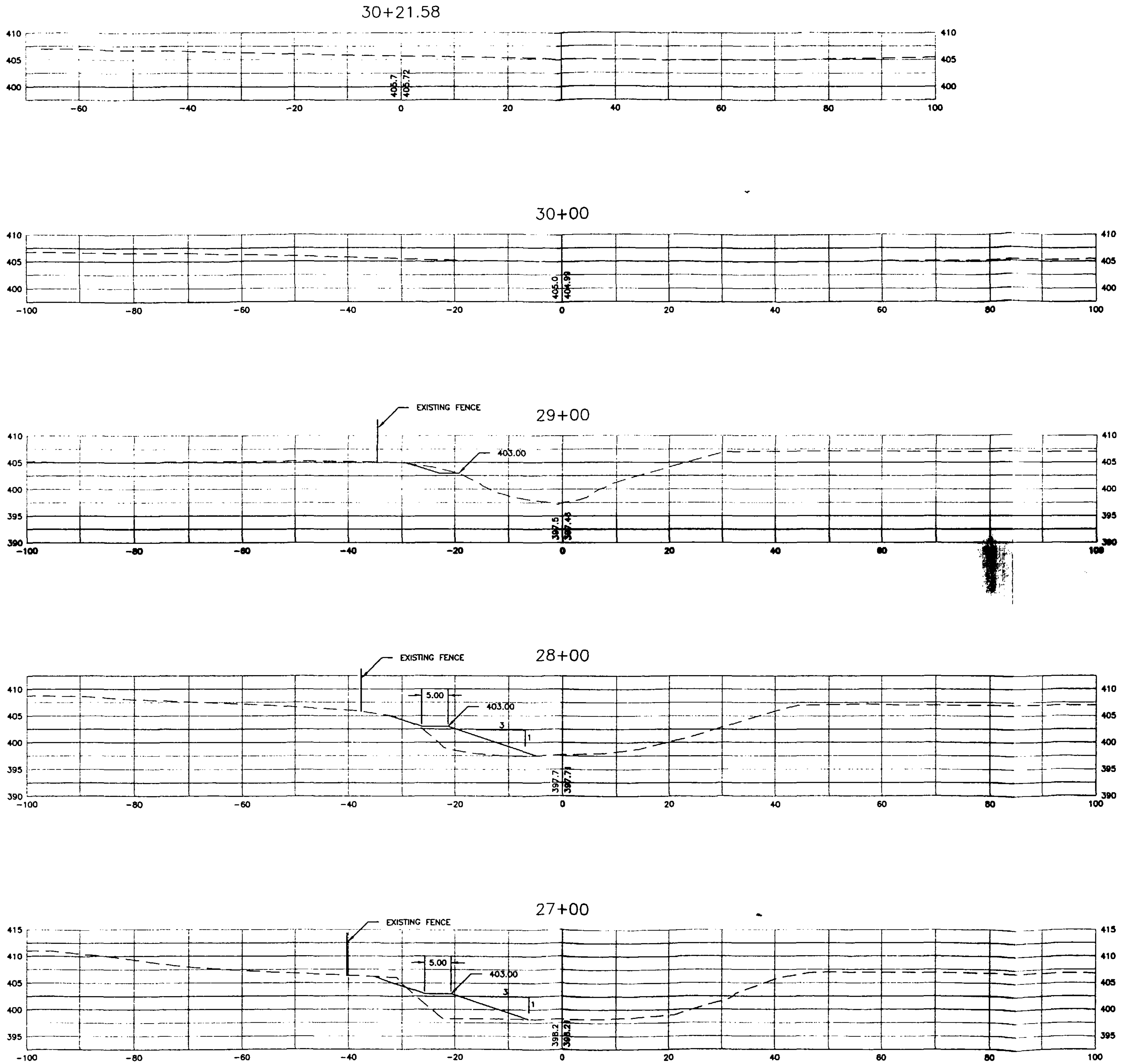
SUPV WJW CHK JAJ
DATE MAY 30, 2003 DR DGR GMW

SOLUTIA

SCALE: AS NOTED

PROJECT NUMBER 12003637.00000

DRAWING NUMBER 8



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DSGN WJW DR WJW CHK JAJ
APPV JAJ CH DSGN GWM
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SOLUTIA

DEAD CREEK SEGMENT B LINER

PROPOSED CROSS SECTIONS

SCALE: AS NOTED
PROJECT NUMBER 12003637.00000
DRAWING NUMBER 9

APPENDIX D

STORMWATER PUMPING SYSTEM

IC 00090

[illegible]
- Corresp.
from others

Office of the Mayor

August 08. 2002

Ms. Robin Prokop, Plant Manager
Solutia, Inc.
W. G. Krummrich Plant
500 Monsanto Avenue
Sauget, Illinois 62206-1198

Dear Ms. Prokop:

Please be advised the Village Board of Trustees at their regular meeting of August 07, 2002 approved the Agreement between Solutia, Inc. W. G. Krummich Plant and the Village of Cahokia for Solutia, Inc. to install pumps and associated piping on Dead Creek between Queeny Avenue and Edgar Street and after the installation of the pumping system the Village of Cahokia will assume responsibility for operating, inspecting. repairing, and maintaining the pumping system except as otherwise provided within he agreement.

Sincerely,

Denita Reed

Denita Reed
Mayor of Cahokia

Village of Cahokia 103 Main Street Cahokia, Illinois 62206-1019
Office 618-337-9500 Fax 618-337-9529

SOLUTIA
Applied Chemistry, Creative Solutions

Solutia Inc.
W.G. Krummrich Plant
500 Monsanto Avenue
Sauget, Illinois 62206-1198
Tel 618-271-5835

July 30, 2002

Mayor Denita Reed
Village of Cahokia

RE: Letter of Agreement Between Solutia Inc. W.G. Krummrich Plant and the Village of Cahokia

Dear Mayor Reed:

This Letter Agreement formalizes the agreement reached by Solutia Inc. ("Solutia") and the Village of Cahokia ("Cahokia") regarding the installation, maintenance, repair and operation of the pumping system to be installed in Dead Creek. The pumping system will consist of five submersible pumps and associated piping to be installed in Dead Creek at the following locations (also shown on the attached map): (1) the earthen berm that covers gas lines midway between Judith Lane and Cahokia Street, (2) the Cahokia Street culvert, (3) the Kinder Street culvert, (4) the Jerome Avenue culvert, and (5) the Edgar Street culvert.

Solutia and Cahokia agree to the following:

- Solutia will install the above-described pumps and associated piping. When operational, the pumping system will move water downstream from one section of Dead Creek to the next and will reduce the amount of standing water in Dead Creek between Queeny Avenue and Edgar Street. Some amount of standing water will remain in each Creek section.
- After the installation of the pumping system, and except as otherwise provided herein, Cahokia will assume responsibility for operating, inspecting, repairing, and maintaining the pumping system.
- Solutia agrees to furnish a spare pump to Cahokia for use in the event of a pump failure.
- For a period not to exceed five (5) years from the date of this Letter Agreement, Solutia agrees to repair or replace malfunctioning pumps at its cost. Cahokia agrees to notify Solutia within twenty-four (24) hours of its discovery of a malfunctioning pump. Such pumps will be removed by Cahokia and kept at the Cahokia Maintenance Facility for pick-up by Solutia. Solutia will return the repaired or replacement pump to the Cahokia Maintenance Facility, and Cahokia will be responsible for replacing the pump.
- After the five (5) year period has elapsed, Cahokia will be responsible for the repair and replacement of pumps and all costs associated therewith.
- Cahokia shall pay all costs associated with the operation, inspection, repair, and maintenance of the pumping system, with the exception of the above-described pump repair or

replacement costs to be assumed by Solutia for a period not to exceed five (5) years from the date of this Letter Agreement.

- As the operator of the pumping system, Cahokia shall comply with all local, State and federal laws related to the operation of the pumping system, including, but not limited to, all applicable permitting or licensing requirements and environmental regulations.
- By entering into this Letter Agreement, Solutia assumes no responsibility for the daily operation of the pumping system or any costs associated therewith.
- In consideration for Solutia's agreement to install the pumping system, Cahokia agrees to release, indemnify and hold Solutia harmless for all claims, demands, liability and damages associated with the pumping system. This obligation shall survive termination of the Letter Agreement.
- This Letter Agreement shall terminate five (5) years from the date of execution by Solutia and Cahokia.

This Letter Agreement sets forth the entire agreement between Solutia and Cahokia with respect to the subject matter hereof. All prior negotiations and dealings regarding this Letter Agreement and the subject matter hereof shall be deemed superseded by and merged into this Letter Agreement.

IN WITNESS WHEREOF, the following parties have reviewed and agree to the above terms and conditions of this Letter Agreement.

SOLUTIA

Robin Prokop
Plant Manager
W.G. Krummrich Plant

VILLAGE OF CAHOKIA

Mayor Denita Reed
Village of Cahokia